Course: Biology I
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Year: IB MYP Year 4 (Grade 9)

Course Description: Biology I is an entry level, laboratory-oriented course. It is designed to prepare students to take the Biology EOI Exam and to take advanced life science courses in the junior and senior years. Biology I stresses the following concepts: science as inquiry, general chemistry, organic chemistry, cellular basis of life, respiration, photosynthesis, mitosis/meiosis, molecular biology, heredity, evolution, and ecology.

Biology I MYP emphasizes the role of inquiry and encourages the development of scientific inquiry skills. It provides students with opportunities to explore the role of science in historical and contemporary contexts. Throughout the course, the five areas of interaction are used as a means to broaden the student experience. The areas of interaction form the basis of the MYP and contribute to an education resulting in global awareness, international understanding and an appreciation of cultural diversity.

Our aims are: The aims of the teaching and study of sciences are to encourage and enable students to:
• develop inquiring minds and curiosity about science and the natural world
• acquire knowledge, conceptual understanding and skills to solve problems and make informed decisions in scientific and other contexts
• develop skills of scientific inquiry to design and carry out scientific investigations and evaluate scientific evidence to draw conclusions
• communicate scientific ideas, arguments and practical experiences accurately in a variety of ways
• think analytically, critically and creatively to solve problems, judge arguments and make decisions in scientific and other contexts
• appreciate the benefits and limitations of science and its application in technological developments
• understand the international nature of science and the interdependence of science, technology and society, including the benefits, limitations and implications imposed by social, economic, political, environmental, cultural and ethical factors
• demonstrate attitudes and develop values of honesty and respect for themselves, others, and their shared environment

You will begin to embody the IB Learner Profile as you display the following qualities: inquirer, knowledgeable, thinker, communicator, principled, open-minded, caring, risk-taker, balanced and reflective.

Biology I is divided into five key units. The units represent a key concept or theme in biology; each unit has one or more guiding questions and presents one of the Areas of Interaction (AOI). There is also an MYP assessment associated with each unit. The following is a summary of each of the units:

Unit Title	AOI	Question	Topic	Assessment
What is Biology?	Approaches to learning	When does the Scientific Method fail? What cannot be investigated using the Scientific Method?	Characteristics of life; Scientific methods; Metric system (SI); Lab Safety	Self designed lab with a focus on particular elements such as research
Life of a Cell	Health and social	How do cells perform the necessary functions of life? How do cells maintain homeostasis?	Chemistry of life; Cell structure & function; Cell transport; Cell life cycle; Energy in a cell	Self designed lab with formal lab report- Osmosis Questions - Final
Genetics	Human Ingenuity	Unraveling the mystery of life: How do four letters (A, G, T, C) direct all cell activities? By studying genetics, can we predict the future?	Mendelian Genetics; Meiosis; Molecular Genetics; Biotechnology	Essay (practice)
Change Through Time	Environment	What is the driving force behind evolution? Are humans still capable of undergoing micro and macro-evolution?	History of life; Theory of Evolution; Classification	Question

Ecology	Health and social; Community Service; Environment	Why are all living things dependent upon the plants? How have our actions left a permanent imprint on the environment?	Communities and Biomes; Population Biology; Conservation	Essay (full)
***Diversity of Life (optional)**	Approaches to learning	What functions/systems do all living things have in common?	Viruses, Bacteria, and Animals	to be determined

At the end of the year, the following IB MYP specific objectives will be covered:

A One world

- describe and discuss ways in which science is applied and used to solve local and global problems
- describe and evaluate the benefits and limitations of science and scientific applications as well as their effect on life and society
- discuss how science and technology are interdependent and assist each other in the development of knowledge and technological applications
- discuss how science and its applications interact with social, economic, political, environmental, cultural and ethical factors.

B Communication in science

- communicate scientific information using a range of scientific language
- communicate scientific information using appropriate modes of communication
- present scientific information in a variety of formats, acknowledging sources as appropriate
- demonstrate honesty when handling data and information, acknowledging sources as appropriate
- use where appropriate a range of information and communication technology applications to access, process and communicate scientific information.

C Knowledge and understanding of science

- recognize and recall scientific information
- explain and apply scientific information to solve problems in familiar and unfamiliar situations
- analyze scientific information by identifying components, relationships and patterns, both in experimental data and ideas
- discuss and evaluate scientific information from different sources (Internet, newspaper articles, television, scientific texts and publications) and assess its credibility.

D Scientific inquiry

- define the problem or research question to be tested by a scientific investigation
- formulate a hypothesis and explain it using logical scientific reasoning
- design scientific investigations that include variables and controls, material/equipment needed, a method to be followed, data to be collected and suggestions for its analysis evaluate the method, commenting on its reliability and/or validity
- suggest improvements to the method.

E Processing data

- collect and record data using appropriate units of measurement
- organize and transform data into numerical and diagrammatic forms, including mathematical calculations and visual representation (tables, graphs and charts)
- present data in a variety of ways using appropriate communication modes and conventions (units of measurement)
- analyze and interpret data by identifying trends, patterns and relationships
- draw conclusions supported by scientific explanations and a reasoned interpretation of the analysis of the data.

F Attitudes in science

- carry out scientific investigations using materials and techniques safely and skillfully
- work effectively as members of a team, collaborating, acknowledging and supporting others as well as ensuring a safe working environment
- show respect for themselves and others, and deal responsibly with the living and non-living environment.

The methodology or the "how" we will learn: Class lectures and discussions; lab experiments (individual/group); cooperative learning; small group activities; posters, research, student presentations, guest speakers and field trips when funds are available.

The PASS objectives of the State of Oklahoma are as follows:

Process Standard 1: Observe and Measure	Identify qualitative and quantitative changes in cells, organisms, populations, and ecosystems given conditions (e.g., temperature, mass, volume, time, position, length, quantity) before, during, and after an event.
	Use appropriate tools with accuracy and precision (e.g., microscope, pipette, metric ruler, graduated cylinder, thermometer, balance, stopwatch) when measuring cells, organisms, populations, and ecosystems.
	Use appropriate International System of Units (SI) (i.e., grams, meters, liters, degrees Celsius, and seconds) and SI prefixes (i.e., micro-, milli-, centi-, and kilo-) when measuring objects and/or events.
Process Standard 2: Classify	Using observable properties, place cells, organisms, and/or events into a biological classification system (e.g., dichotomous keys, taxonomy charts, cladograms).
	Identify the properties by which a biological classification system is based.
Process Standard 3: Experimental Design	Evaluate the design of a biology laboratory experiment. Identify the independent variables, dependent variables, controlled variables, and control set-up in an experiment. Use mathematics to show relationships within a given set of observations (e.g., population studies, biomass, and

	probability). Identify a hypothesis for a given problem in biology investigations. Recognize potential hazards and practice safety procedures in all biology activities.
Process Standard 4: Interpret and Communicate	Select appropriate predictions based on previously observed patterns of evidence. Report and display data using appropriate-technology and other media. Interpret data tables, line, bar, trend, and/or circle graphs from existing science research or student experiments. Determine if results of biological science investigations support or do not support hypotheses. Evaluate experimental data to draw the conclusion that is best supported by the evidence. Routinely prepare a written report describing the sequence, results, and interpretation of a biological investigation or event Communicate or defend scientific thinking that results in conclusions. Identify and/or create an appropriate graph or chart from collected data, tables, or written description (e.g., population studies, plant growth, and heart rate).
Process Standard 5: Model	Interpret a biological model which explains a given set of observations. Select predictions based on models (e.g., pedigrees, life cycles), and when appropriate, apply mathematical reasoning to make accurate predictions. Compare a given model to the living world.
Process Standard 6: Inquiry	Ask a scientific question, formulate a testable hypothesis, and design an appropriate experiment relating to the living world. Design and conduct biological investigations in which variables are identified and controlled. Use a variety of technologies (e.g., probes, handheld digital devices, electrophoresis equipment, digital cameras, software, calculators, digital balances, microscopes, measuring instruments, and computers) to collect, analyze and display data.
Standard 1: The Cell	1. Cells are composed of a variety of structures such as the nucleus, cell/plasma membrane, cell wall, cytoplasm, ribosomes, mitochondria, and chloroplasts. a. The cell/plasma membrane functions (i.e., active transport, passive transport, diffusion, osmosis, and surface area to volume ratio) to maintain homeostasis. b. Differentiate among hypotonic, hypertonic, and isotonic conditions. c. Compare and contrast prokaryotic and eukaryotic cells. 2. In multicellular organisms, cells have levels of organization (i.e., cells, tissues, organs, organ systems, organisms). 3. Specialized cells enable organisms to monitor what is going on in the world around them (e.g., detect light, sound, specific chemicals, gravity, plant tropism, sense organs, homeostasis)
Standard 2: The Molecular Basis of Heredity	1. Cells function according to the information contained in the master code of DNA (i.e., cell cycle, DNA replication and transcription). Transfer RNA and protein synthesis will be taught in life science courses with rigor greater than Biology I. 2. A sorting and recombination of genes during sexual reproduction results in a great variety of possible gene combinations from the offspring of any two parents (i.e., Punnett squares and pedigrees). Students will understand concepts in a single trait cross (e.g., alleles, dominant trait, recessive trait, phenotype, genotype, homozygous, heterozygous, incomplete dominance, and sex-linked traits).
Standard 3: Biological	1. Different species might look dissimilar, but the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of common ancestry (e.g., homologous and

Diversity	analogous structures, embryology, fossil record, genetic data). 2. Characteristics of populations change through the mechanism of natural selection. These biological adaptations, including changes in structures, behaviors, and/or physiology, may enhance or limit survival and reproductive success within a particular environment. 3. Broad patterns of behavior exhibited by animals have changed over time to ensure reproductive success. Responses to external stimuli can result from interactions with the organism's own species and others, as well as environmental changes; these responses can be either innate or learned.
Standard 4: The Interdependence of Organisms	1. Organisms both cooperate and compete in ecosystems (e.g., symbiotic relationships). 2. Living organisms have the capacity to produce populations of infinite size, but environments and resources limit population size (e.g., carrying capacity, limiting factors, ecological succession).
Standard 5: Matter, Energy, and Organization in Living Systems	1. The complexity and organization of organisms accommodates the need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain the organism (i.e., photosynthesis and cellular respiration). 2. As matter and energy flow through different levels of organization of living systems and between living systems and the physical environment, chemical elements are recombined in different ways by different structures. Matter and energy are conserved in each change (i.e., water cycle, carbon cycle, nitrogen cycle, food webs, and energy pyramids). 3. Matter on earth cycles among the living (biotic) and nonliving (abiotic) components of the biosphere.

Assessment is the term used to measure the students' demonstrations of learning:
There will be summative assessment projects and tests to show what they have learned. These will be assessed using the IB MYP criteria.

During the year each of these criteria will be measured at least twice, not necessarily at the same time. Because this is criterion based assessment you are not measured against others – it is not normative. All work will be compiled in a **portfolio**.

Internal Grading Policy: BTW uses a four point grading scale except in the case of weighted classes.

Unweighted	**Weighted**
A= 4 points	A=5 points status. The class is denoted on the transcript
B=3 points	B=4 points with an asterisk (*) preceding the class title.
C=2 points	C=3 points Rank is determined on the weighted grade
D=1 point	D= 1 point average at the end of the seventh
F=0 points	F= 0 points

Resources and materials:
Glencoe; <u>Biology: The Dynamics of Life</u>