IB Biology HL is taught over two years. At Metro Academic and Classical High School, we have a quarter system, so the class units are broken up by units by quarter. The unit lengths are estimates only. Classes meet 2-3 days per week, with 90-minute class periods divided into two sections (45 min synchronous and 45 min asynchronous). Please note, this document represents a GOAL; in general, timing is wishful thinking, and we are often behind schedule!

**Year 1 Quarter 1**

Cell Theory

IB topic(s): 1.1 and 1.5

Essential Idea(s): Living organisms are composed of cells that share common characteristics.

Unit Length: 4-5 days \*combines with beginning of the school year activities

Microscopy

IB topic(s): 1.1 and 1.2

Essential Idea(s): Microscopes are an important tool used in the study of cellular biology.

Unit Length: 2 days

Prokaryotic Cells

IB topic(s): 1.2, 3.2 and 6.3

Essential Idea(s): Prokaryotes have a have a much simpler cell structure than eukaryotes

Unit Length: 2 days

Eukaryotic Cells

IB topic(s): 1.2, 1.4 and 1.5

Essential Idea(s): Eukaryotes have a much more complex cell structure than prokaryotes

Unit Length: 2 days

Stem Cells and Differentiation

IB topic(s): 1.1 and 3.5

Essential Idea(s): Stem cells are capable of dividing and differentiating along different pathways.

Unit Length: 2 days

A: Cell Division

IB topic(s): 1.6, 3.2 and 7.1

Essential Idea(s): Cell division involves interphase, mitosis and cytokinesis.

Unit Length: 2-2.5 days

B: Cell Cycle and Cancer

IB topic(s): 1.6, 6.4, D.1 and D.6

Essential Idea(s): Control of the cell cycle is essential and must be controlled

Unit Length: 2-2.5 days

**Year 1 Quarter 2**

Cell Membrane Structure

IB topic(s): 1.3

Essential Idea(s): The structure of biological membranes makes them fluid and dynamic

Unit Length: 1-2 day

Cell Membrane Transport

IB topic(s): 1.1 and 1.4

Essential Idea(s): Membranes control the composition of cells by active and passive transport

Unit Length: 2-2.5 days

Water

IB topic(s): 2.2

Essential Idea(s): Water is the medium of life.

Unit Length: 1-2 days

Introduction to Molecular Biology

IB topic(s): 2.1 and D.1

Essential Idea(s): Compounds of carbon, hydrogen and oxygen are used to supply and store energy.

Unit Length: 7 days

Carbohydrates and Lipids

IB topic(s): 2.1, 2.3 and D.1

Essential Idea(s): Compounds of carbon, hydrogen and oxygen are used to supply and store energy.

Unit Length: 4 days

Nucleic Acids

IB topic(s): 2.6, 3.5 and 7.1

Essential Idea(s): The structure of DNA allows efficient storage of genetic information.

Unit Length: 3-4 days

**Year 1 Quarter 3**

Protein Structure and Function

IB topic(s): 2.1, 2.4, 7.3 and D.1

Essential Idea(s): Proteins have a very wide range of functions in living organisms.

Unit Length: 3.5 days

Enzymes and Metabolism

IB topic(s): 2.1, 2.5 and 8.1

Essential Idea(s): Living Organisms control their composition by complex web of chemical reactions. Metabolic reactions are regulated in response to the cell’s needs. Enzymes control the metabolism of the cell.

Unit Length: 4 days

Genes and Genomes

IB topic(s): 3.1, 3.2, 3.4, 7.1 and 7.3

Essential Idea(s): Every living organism inherits a blueprint for life from its parents / Chromosomes carry genes in a linear sequence that is shared by members of a species.

Unit Length: 3-3.5 days

Chromosomes

IB topic(s): 3.2, 3.3 and 6.6

Essential Idea(s): Chromosomes carry genes in a linear sequence that is shared by members of a species.

Unit Length: 2-2.5 days

Meiosis

IB topic(s): 3.3, 3.4, 10.1 and 10.2

Essential Idea(s): Alleles segregate during meiosis allowing new combinations to be formed by the fusion of gametes / Meiosis leads to independent assortment of chromosomes and unique composition of alleles in daughter cells.

Unit Length: 3-3.5 days

**Year 1 Quarter 4**

DNA Replication

IB topic(s): 2.7, 3.5 and 7.1

Essential Idea(s): The structure of DNA is ideally suited to its replication.

Unit Length: 2-2.5 days

Transcription

IB topic(s): 2.7, 7.1 and 7.2

Essential Idea(s): Information stored as a code in DNA is copied onto mRNA.

Unit Length: 2-2.5 days

Control of Gene Expression

IB topic(s): 7.1 and 7.2

Essential Idea(s): Cells can control when and where specific genes are expressed

Unit Length: 1.5-2 days

Translation

IB topic(s): 2.7 and 7.3

Essential Idea(s): Information transferred from DNA to mRNA is translated into an amino acid sequence

Unit Length: 3-3.5 days

Genetic Engineering

IB topic(s): 2.7 and 3.5

Essential Idea(s): Biologists have developed techniques for artificial manipulation of DNA, cells and organisms

Unit Length: 2.5-3 days

Genetic Inheritance

IB topic(s): 3.4 and D.1

Essential Idea(s): The inheritance of genes follows patterns.

Unit Length: 3-3.5 days

More Complex Genetics

IB topic(s): 10.1 and 10.2

Essential Idea(s): Genes may be linked or unlinked and are inherited accordingly.

Unit Length: 3 days

Summer Assignment

Communities and Ecosystems

IB topic(s): 4.1 and 9.4

Essential Idea(s): The continued survival of living organisms including humans depends on sustainable communities.

Unit Length: 2 days

Energy Flow through Ecosystems

IB topic(s): 4.1 and 4.2

Essential Idea(s): Ecosystems require a continuous supply of energy to fuel life processes and to replace energy lost as heat.

Unit Length: 2 days

Nutrient Cycles

IB topic(s): 4.1 and 4.3

Essential Idea(s): Continued availability of carbon in ecosystems depends on carbon cycling.

Unit Length: 3 days

Climate Change

IB topic(s): 4.4

Essential Idea(s): Concentrations of gases in the atmosphere affect climates experienced at the Earth’s surface.

Unit Length: 2 days

**Year 2 Quarter 1**

Respiration

Anaerobic Respiration

IB topic(s): 2.8 and 8.2

Essential Idea(s): Cell respiration supplies energy for the functions of life

Unit Length: 2 days

Aerobic Respiration

IB topic(s): 2.8 and 8.2

Essential Idea(s): Energy is converted to a usable form in cell respiration

Unit Length: 3 days

Photosynthesis

Light and Pigments

IB topic(s): 2.9

Essential Idea(s): Specific wavelengths of light activate photosynthetic pigments.

Unit Length: 1-1.5 days

Photosynthesis

IB topic(s): 2.9 and 8.3

Essential Idea(s): Photosynthesis uses the energy in sunlight to produce the chemical energy needed for life / Light energy is converted into chemical energy

Unit Length: 4 days

Xylem Structure and Function

IB topic(s): 9.1 and 9.2

Essential Idea(s): Structure and function are correlated in the xylem in plants.

Unit Length: 2-2.5 days

Phloem Structure and Function

IB topic(s): 9.2

Essential Idea(s): Structure and function are correlated in the phloem in plants.

Unit Length: 1.5-2 days

Plant Response and Growth

IB topic(s): 9.3

Essential Idea(s): Plants adapt their growth to environmental conditions.

Unit Length: 3 days

Angiosperm Reproduction

IB topic(s): 9.4

Essential Idea(s): Reproduction in flowering plants is influenced by the biotic and abiotic environments.

Unit Length: 3 days

**Year 2 Quarter 3**

The Digestive System

IB topic(s): 6.1 and D.2

Essential Idea(s): The structure of the digestive system allows it to move, digest, absorb and egest food.

Unit Length: 5 days

Liver Structure and Function

IB topic(s): D.3

Essential Idea(s): The chemical composition of the blood is regulated by the liver.

Unit Length: 3 days

Kidney Structure and Function

IB topic(s): 11.3

Essential Idea(s): All animals excrete nitrogenous waste products and some animals also balance water and solute concentrations.

Unit Length: 3.5-4 days

Neural Structure and Function

IB topic(s): 1.4 and 6.5

Essential Idea(s): Neurons transmit the message, synapses modulate the message.

Unit Length: 2 days

Muscles and Movement

IB topic(s): 11.2

Essential Idea(s): The roles of musculoskeletal system are movement, support and protection.

Unit Length: 3 days

The Heart

IB topic(s): 6.2, D.1 and D.4

Essential Idea(s): Internal and external factors influence heart function.

Unit Length: 4 days

The Circulatory System

IB topic(s): 6.2, 6.3, D.1 and D.4

Essential Idea(s): The blood system continuously transports substances to cells and simultaneously collects waste products.

Unit Length: 3 days

Respiration

The Respiratory System

IB topic(s): 6.4 and D.6

Essential Idea(s): The lungs are actively ventilated to ensure that gas exchange can occur passively.

Unit Length: 2.5-3 days

Transport of Respiratory Gases

IB topic(s): D.6

Essential Idea(s): Red blood cells are vital in the transport of respiratory gases.

Unit Length: 1.5-2 days

**Year 2 Quarter 4**

Immunity

Innate Immunity

IB topic(s): 6.3

Essential Idea(s): The human body has structures and processes that resist the continuous threat of invasion by pathogens.

Unit Length: 1 days

Acquired Immunity

IB topic(s): 6.3 and 11.1

Essential Idea(s): Immunity is based on recognition of self and destruction of foreign material.

Unit Length: 1.5-2 days

Hormones and Homeostasis

IB topic(s): 6.6. D.1 and D.5

Essential Idea(s): Hormones are used when signals need to be widely distributed to maintain homeostasis.

Unit Length: 4 days

Reproductive Hormones

IB topic(s): 6.6. 11.4 and D.5

Essential Idea(s): Hormones influence human male and female reproduction.

Unit Length: 3 days

Gametogenesis

IB topic(s): 11.4

Essential Idea(s): Formation of haploid gametes is required for sexual reproduction.

Unit Length: 2.5-3 days

Pregnancy and Birth

IB topic(s): 11.4

Essential Idea(s): Pregnancy and birth are regulated by interactions between maternal and fetal systems.

Unit Length: 2.5-3 days

**Time Permitting**

Natural Selection

IB topic(s): 5.1, 5.2, 10.2, 10.3

Essential Idea(s): The diversity of life has evolved and continues to evolve by natural selection.

Unit Length: 3-3.5 days

Evidence for Evolution

IB topic(s): 5.1, 5.2 and 6.3

Essential Idea(s): There is overwhelming evidence for the evolution of life on Earth.

Unit Length: 2-3 days

Speciation

IB topic(s): 4.1, 5.1 and 10.3

Essential Idea(s): Gene pools change over time.

Unit Length: 2 days

Classification and Biodiversity

Classification

IB topic(s): 5.3

Essential Idea(s): Species are named and classified using an internationally agreed system.

Unit Length: 2 days

Biodiversity

IB topic(s): 5.3

Essential Idea(s): The identification of organisms can be aided with the use of a dichotomous key.

Unit Length: 2 days

Cladistics

IB topic(s): 5.3, 5.4, D.1

Essential Idea(s): The ancestry of groups of species can be deduced by comparing their base or amino acid sequences.

Unit Length: 3-3.5 days

**Test Preparation**

**Post Test**