HUDSONVILLE HIGH SCHOOL COURSE FRAMEWORK

COURSE / SUBJECT Biology A

Key Course Objectives/Enduring Understandings

(Important ideas and core processes)

Chemistry of Life

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Water *5 Class Sessions*	*(By the end of the unit, students will be able to…)* • discuss how hydrogen and oxygen atoms form covalent bonds in the formation of polar water molecules. • list and describe several unique chemical and physical properties of water and discuss how the structure of water molecules influences each property. • Explain how the unique chemical and physical properties of water make life on Earth possible.

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Organic Molecules in Organisms *2 Class Sessions*	*(By the end of the unit, students will be able to…)* • explain how the atomic structure of carbon is unique. • describe the role of carbon in the molecules necessary for life. • explain how cells synthesize and break down macromolecules. • describe the structure and function of biologically important molecules (carbohydrates, lipids, proteins, nucleic acids).

Unit Pacing *(names of units and approximate pacing)*	**Unit Learning Targets** *(By the end of the unit, students will be able to…)*
Enzymes *3 Class Sessions*	• describe how enzymes speed up chemical reaction rates. • discuss the importance of shape on enzyme activity and specificity. • describe how environmental factors (pH, temperature, force, etc.) affect the function and shape (denaturing) of enzymes.

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(Important ideas and core processes)

Cells

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Prokaryotic and Eukaryotic Cells *3 Class Sessions*	*(By the end of the unit, students will be able to…)* • compare the similarities and differences between prokaryotic and eukaryotic cells. • identify organisms that are prokaryotic and organisms that are eukaryotic.

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Membranes *3 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe the current model of membrane structure. • explain the various roles of proteins in the cell membrane. • compare and contrast different types of active and passive transport.

Unit Pacing

(names of units and approximate pacing)

Sub-cellular Organization

3 Class Sessions

Unit Learning Targets

(By the end of the unit, students will be able to…)

- describe the structures of all cell organelles.
- describe the functions of all cell organelles.
- explain how structure relates to function in organelles such as chloroplasts and mitochondria.
- list and explain factors that limit cell size.
- describe the structure of a eukaryotic chromosome.

Unit Pacing

(names of units and approximate pacing)

Cell Cycle and its Regulation

9 Class Sessions

Unit Learning Targets

(By the end of the unit, students will be able to…)

- diagram the replication of DNA.
- diagram, in detail, how cells produce new, identical daughter cells.
- describe how the cell cycle is regulated and discuss it relationship to cancer.

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Cellular Energetics

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Energy Molecules *2 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe the role of ADP and ATP in anabolic and catabolic processes. • explain how chemiosmosis produces ATP.
(names of units and approximate pacing) Photosynthesis *6 Class Sessions*	*(By the end of the unit, students will be able to…)* • explain, in detail, how photosynthesis converts light energy into bond energy in glucose.
(names of units and approximate pacing) Cellular Respiration and Fermentation *6 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe, in detail, how cells generate ATP through cell respiration. • describe how cells generate ATP through fermentation. • discuss how matter cycles and energy flows during the processes of photosynthesis and cell respiration.

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Heredity

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Meiosis *3 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe, in detail, how the genetic information is cut in half during the process of meiosis, and explain its importance in heredity. • Describe the basic principles of segregation and independent assortment in relation to meiosis.

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Inheritance Patterns *5 Class Sessions*	*(By the end of the unit, students will be able to…)* • explain the principle patterns of inheritance (i.e. dominant, recessive, co-dominance, incomplete dominance, polygenic inheritance, multiple allele inheritance). • use a punnett square to determine genotypic and phenotypic ratios in offspring of mono and dihybrid crosses. • use a pedigree as a tool for genetic analysis.

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Molecular Genetics

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Protein Synthesis *3 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe how DNA stores genetic information. • describe, in detail, how DNA directs the production of a protein.
(names of units and approximate pacing) Mutation *1 Class Session*	*(By the end of the unit, students will be able to…)* • identify and describe common DNA mutations. • identify and describe common chromosomal mutations.
(names of units and approximate pacing) Nucleic Acid Technology and Applications *2 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe common methods of genetic technology. • discuss moral and ethical issues surrounding genetic engineering.

HUDSONVILLE HIGH SCHOOL COURSE FRAMEWORK

COURSE / SUBJECT Biology A

Key Course Objectives/Enduring Understandings

(Important ideas and core processes)

Investigation

Unit Pacing

(names of units and approximate pacing)

Inquiry and Reflection

Consistently reinforced throughout the duration of the instructional calendar.

Unit Learning Targets

(By the end of the unit, students will be able to…)

- recognize the difference between testable and non-testable questions for inquiry.
- identify appropriate tools and techniques used in designing and conducting scientific investigations to test hypotheses.

HUDSONVILLE HIGH SCHOOL COURSE FRAMEWORK

COURSE / SUBJECT Biology B

Key Course Objectives/Enduring Understandings

(Important ideas and core processes)

Diversity of Organisms

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Survey of the Diversity of Life *3 Class Sessions*	*(By the end of the unit, students will be able to…)* • know the biological hierarchy of living things. • identify various organisms from the Bacteria, Archaea and Eukarya domains. • identify various members of the major animal phyla and plant divisions.
Unit Pacing *(names of units and approximate pacing)* Phylogenetic Classification *1 Class Session*	**Unit Learning Targets** *(By the end of the unit, students will be able to…)* • identify distinguishing characteristics of domains and kingdoms.
Unit Pacing *(names of units and approximate pacing)* Viral Structure and Replication *2 Class Sessions*	**Unit Learning Targets** *(By the end of the unit, students will be able to…)* • describe the structure of a virus. • compare and contrast lytic and lysogenic viral replication.

HUDSONVILLE HIGH SCHOOL COURSE FRAMEWORK

COURSE / SUBJECT Biology B

Key Course Objectives/Enduring Understandings

(Important ideas and core processes)

Evolutionary Biology

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Early Evolution of Life *2 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe the current biological model for the origins of organic macromolecules and discuss why controversy surrounds this model. • describe the current biological model for the origins of prokaryotic and eukaryotic cells and discuss why controversy surrounds this model.

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Mechanisms of Evolution *6 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe the role of natural selection in the process of microevolution • identify proposed mechanisms that account for speciation and macroevolution

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COURSE / SUBJECT Biology B

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(Important ideas and core processes)

Structure and Function of Plants

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Reproduction, Growth and Development *4 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe sexual reproduction in plants. • explain both primary and secondary growth in plants.
(names of units and approximate pacing) Structural and Physiological Characteristics *4 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe the structure and function of the four main plant tissues. • explain the structure and function of roots, stems and leaves. • identify adaptive features that have contributed to the success of various plant groups.
(names of units and approximate pacing) Plant Organ Interactions *3 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe how organ systems interact (transpiration, absorption, root hairs, bulk flow)

Unit Pacing

(names of units and approximate pacing)

Response to the Environment

2 Class Sessions

Unit Learning Targets

(By the end of the unit, students will be able to…)

- identify the responses of plants to environmental cues.
- understand common plant hormones and their functions.

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(Important ideas and core processes)

Human Anatomy and Physiology

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Homeostasis *1 Class Session*	*(By the end of the unit, students will be able to…)* • explain homeostasis and describe how it is maintained.

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Organization *11 Class Sessions*	*(By the end of the unit, students will be able to…)* • explain the hierarchy of cellular organization in humans. • explain the general function of each human organ system. • describe the structure and function of human organs found in each organ system.

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(Important ideas and core processes)

Ecology

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Population Dynamics *2 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe the various ways populations grow. • explain how population size is regulated by abiotic and biotic factors.

Unit Pacing	Unit Learning Targets
(names of units and approximate pacing) Communities and Ecosystems *4 Class Sessions*	*(By the end of the unit, students will be able to…)* • describe how energy flows through an ecosystem in relation to trophic levels. • describe how elements (carbon and nitrogen) and compounds (water) cycle in an ecosystem. • describe various interactions within a community. • describe the importance of diversity to a healthy ecosystem. • explain the process of succession.

Unit Pacing *(names of units and approximate pacing)* Global Issues *2 Class Sessions*	**Unit Learning Targets** *(By the end of the unit, students will be able to…)* • Explain how a large and growing human population impacts the Earth. (acid rain, climate change, ozone depletion, invasive species, pollution/biological magnification)

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COURSE / SUBJECT Biology B

Key Course Objectives/Enduring Understandings

(Important ideas and core processes)

Investigation

Unit Pacing

(names of units and approximate pacing)

Inquiry and Reflection

Consistently reinforced throughout the duration of the instructional calendar.

Unit Learning Targets

(By the end of the unit, students will be able to…)

- recognize the difference between testable and non-testable questions for inquiry.
- identify appropriate tools and techniques used in designing and conducting scientific investigations to test hypotheses.