Mattawan Consolidated Schools
Biology 9 Essential Standards Chart

Standard Description	Next Generation Science Standards (NGSS)	Example of Rigor	Prerequisite Skills	Common Assessment	When Taught?	Extension Standards
What is the essential standard to be learned? Describe in student friendly vocabulary.		What does proficient look like? Provide an example and/or description.	What prior knowledge, skills, and/or vocabulary is/are needed for a student to master this standard?	What assessments will be used to measure student mastery?	When will this standard be taught?	What will we do when students have learned the essential standard(s)?
Identify what makes something living vs nonliving.	HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	List all the characteristics and/or life processes of a living organism.	Basic knowledge of growth, nutrition, reproduction, and environmental response	Common Unit 1 Assessment	Semester 1-Unit 1 Chapter 1	Applications to homeostasis and metabolism -Heart rate lab Theories of spontaneous generation and biogenesis
Identify the parts of a controlled experiment (independent variable, dependent variable, control group, control variable).	NGSS Cross Cutting Concept: Cause and effect: Events have causes, sometimes simple, sometimes multifaceted. Systems and models: A system is an organized	When given the complete experimental design, students can identify four parts.	Basic knowledge of experimental set-up Basic knowledge of cause and effect or independent and dependent variable	Common Unit 1 Assessment Scenario worksheets Six Liquids Lab common assessment	Semester 1-Unit 1 Chapter 1	Experimental design lab Identify variables in future lab reports

	group of related objects or components; models can be used for understanding and predicting the behavior of systems.					
Identify the parts of a molecule's structure and explain how that relates to function (carbs, proteins, nucleic acids, lipids).	H-LS1-6: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	When given a material, models of molecular structure can be built. Match functions with molecules.	Atoms Charges Molecules Ionic bonds Covalent bonds Food groups/nutrition	Common Unit 2 Assessment Unit 2 quiz (Honors) Build molecules Foods Testing Lab Macromolecule POGIL	Semester 1-Unit 2 Chapter 3	Saturated and unsaturated lipids Types of reactions- hydrolysis and dehydration synthesis Function of ATP pH lab
Explain the structure and function relationship of different cell types (prokaryotic, eukaryotic, plant, animal).	HS-LS1-2: Cell structure and function is the basis for living cells.	When given an example, students are able to identify prokaryotic or eukaryotic cells. Match organelles with functions. Identify if a material will move in/out of a cell.	Solutions Basic cell structure Microscope work	Common Unit 3 Assessment Organelle analogy presentation (standard/ Tier 2) Unit 3 Organelles quiz (Honors)	Semester 1-Unit 3 Chapter 4 & 5 Diffusion/Egg Diagram Drawings	Protein processing Levels of organization - Tissues structure/function relationship Additional organelles (endoplasmic reticulum, golgi body, nuclear membrane)

						Cell microscopy lab Types of transport Diffusion and Osmosis lab (graphing and calculations included)
Explain the chemical equations for cellular respiration & photosynthesis, their relationship to each other, and how they work to use and produce energy.	HS-LS1-5: Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. HS-LS1-6: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. HS-LS1-7: Use a model to illustrate that cellular	Students can construct a model showing the relationship between reactants and products of photosynthesis and respiration. When given a chemical equation, molecules can be identified.	Organelle function Cell structure Matter/energy	Common Unit 4 Assessment Photosynthesis POGIL Photosynthesis Spinach Leaf Lab (Honors)	Semester 1-Unit 4 Chapters 6 & 7 Priestley Experiment Organelle Diagramming How it's Made Lab	Structure and function of ATP Glycolysis, Kreb's cycle, and ETC Light dependent reactions and Calvin Cycle Fermentation- lactic acid vs. alcoholic

	respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.					
Explain the cell cycle and where new cells come from.	HS-LS1-4: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	When given the cell cycle phase, be able to describe the actions occurring in the cell. Be able to explain the actions occurring in the nucleus that divide the DNA to new cells. Student can describe why cells need to divide.	Cell structure Basics of DNA	Common Unit 5 Assessment	Semester-Unit 5 Chapter 8 Cell Division POGIL	Cell cycle checkpoints Applications to tumors and cancer Identification of mitotic phases from microscope practical Onion root tip lab Binary fission
Explain multiple ways that genetic variation can occur in an organism.	HS-LS3-2: Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic	Students can explain the origins of genetic variation (sexual reproduction, meiosis, mutation)	Compare/contrast sexual and asexual reproduction Basic function of DNA	Common Unit 6 Assessment	Semester 1-Unit 6 Ch. 8.3 Meiosis Ch.11 Mutations Meiosis modeling Mitosis & Meiosis	Cloning Chromosomal abnormalities & karyotype analysis Cancer

	combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. HS-LS3-3: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits.	Students can use probability tools to find predicted traits using monohybrid crosses.	Process of cell division Traits are passed from parent to offspring		cut & paste activities Predicting Ratios Activity Baby Making (coin toss genetics) Spongebob crosses wksts	applications Dihybrid and non-Mendelian trait crosses *Drosophila* genetics lab (Honors) Pedigree analysis
Transcribe and translate the genetic code to build a chain of amino acids.	HS-LS1-1: Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	When given a segment of DNA, students will be able to transcribe & translate the code to build a chain of amino acids. Student can describe the overall purpose of protein synthesis.	Know cell structure, particularly nucleus and ribosomes Know the basis of protein structure (combination of amino acids with peptide bonds)	Common Unit 7 Assessment	Semester 2-Unit 7 Chapter 10 Decoding Activity Transcription & Translation coloring Protein synthesis modeling activity	Exon/Intron Gene expression Mutations
Describe how natural selection can lead to new species.	HS-LS4-2: Construct an explanation based on evidence that the process of	Students will be able to identify the evidence supporting the theory of evolution:	Understand the origin and effect of mutations Process of	Common Unit 8 Assessment	Semester 2-Unit 8 Ch. 14-16 R”evolutionary” Comic Book	Antibiotic resistance Natural selection character project

	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.	Species numbers Genetic variation Competition and Natural selection.	inheritance Concept of genetic variation in populations		Sex and the single guppy Peppered moth Fossil building Embryology	
Know why and how my body responds when I get injured or infected by pathogens and ways to avoid infections and diseases.	HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	Students can explain how the lines of defense in the human body work together to destroy and protect against pathogens. Student can describe the differences in viruses and bacteria.	Cells Tissues Molecules Homeostasis	Common Unit 9 Assessment	Semester 2-Unit 9 Body mapping -1-3 lines of defense (life size) Spread of Pathogens POGIL	Immunizations Antibiotic resistance Bacterial culture and antibiotic testing

Explain how organisms get energy by making or obtaining their food and how much energy is preserved at each step in the chain.	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. HS-LS2-4: Use of mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	Students can analyze food webs, food chains, and energy pyramids. Students can describe energy loss in feed relationships.	Photosynthesis Cellular respiration Use of ATP	Common unit 10 Assessment	Semester 2-Unit 10 Energy Transfer POGIL	Biomagnification Competitive exclusion Population dynamics, graph analysis
Explain how matter is cycled between living organisms and the environment.	HS-LS2-5: Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	Student can describe the relationship between cellular respiration, photosynthesis, decomposition, and combustion.	Cellular respiration and photosynthesis reactants and products.	Common unit 10 Assessment	Semester 2 - unit 10 Photosynthesis and Cellular Respiration POGIL Biogeochemical cycles book (Honors)	Greenhouse Effect and Global Warming