Boonton School District

Course Title:	Honors Biology	**Grade Level(s):**	**9**		
Curriculum Area / Level:	Science	**Credits:**	**5**		
Course prerequisites and/or co-requisites:	Middle School Science				
Course Description:	Honors Biology is a molecular based first year Biology course. It is anticipated that students selecting the Honors level will be able to achieve at a faster pace and deeper level than required in College Preparatory Biology. Emphasis will be on conceptual understanding, application of facts, and mathematical analysis of information in both laboratory and class work. Weekly lab reports are required. The course topics include Chemistry of Life, Cellular Processes, Photosynthesis, Genetics, Biotechnology, Natural Selection, Bacteria, Plants, Animals, Ecology and Human Body Systems. Extensive independent reading is required.				
Created by:	Evan Price	**Date:**	**7/1/16**	**BOE Approval:**	9/26/16
District Equity Statement:	As required by state law, it is the policy of Boonton School District not to discriminate on the basis of race, color, creed, religion, sex, ancestry, national origin, social or economic status, pregnancy, or physical handicap in its educational programs or activities and to maintain a learning environment that is free from sexual harassment. Courses of study and instructional materials shall be designed and selected in order to eliminate discrimination and promote understanding, sex equity, and mutual respect among people. No course offering, including but not limited to physical education, health, technology education, vocational, home economics, music and adult education, shall be limited on the basis of race, color, creed, religion, sex, ancestry, national origin, social or economic status, pregnancy, or physical handicap. Furthermore, there shall be no discrimination against students as to any educational activity or program because of pregnancy, childbirth, pregnancy-related disabilities, actual or potential parenthood, or family or marital status. If a student requests to be excluded or a physician certifies that such is necessary for her physical, mental, or emotional well-being, she must be provided with adequate and timely opportunity for instruction to continue or make up her schoolwork without prejudice or penalty.				

Division of Umbrella & Mini Units	
Umbrella Unit 1 Topic / Name: Basis of Biology	**Mini Unit(s)** ***(Add to the list of mini units as necessary)*** **1A. Biology Basics** **1B. Biochemistry** **1C. Cell Connections and Human Body**
Umbrella Unit 2 Topic / Name: Cellular Biology	**Mini Unit(s)** ***(Add to the list of mini units as necessary)*** **2A. Energy and Photosynthesis** **2B. Cellular Respiration** **2C. DNA - Replication and Protein Synthesis**
Umbrella Unit 3 Topic / Name: Genetics and Evolution	**Mini Unit(s)** ***(Add to the list of mini units as necessary)*** **3A. Cell Division** **3B. Genetics** **3C. Evolution**
Umbrella Unit 4 Topic / Name: Ecology	**Mini Unit(s)** ***(Add to the list of mini units as necessary)*** **4A. Survey of the Kingdoms** **4B. Ecology** **4C. Human Body Systems**

UMBRELLA UNIT 1	
Title:	Basis of Biology
Duration:	8 Weeks
Essential Questions:	What characteristics are used to distinguish between biotic and abiotic factors? How does evolution connect to all themes in biology? How do scientists test hypotheses? How are the structures of various organelles related to their function? How are unique bonding properties of atoms responsible for creating molecules essential to life? How do the unique characteristics of water allow for life on Earth? What is the role of carbon in the molecular diversity of life? How do the structures of biologically important molecules account for their functions?
Summative Assessments: **(Assessment at the end the learning period)**	Unit Tests Laboratory summative exam
Formative Assessments: **(Ongoing assessments during the learning period)**	Unit Quizzes (Weekly) Laboratory Assessments Projects
Differentiation:	Modified examinations, scaffolding for questions
TECHNOLOGY STANDARD (STANDARD 8)	
CPI #	**CUMULATIVE PROGRESS INDICATOR (CPI)**
8.1.12.A.4	**Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and**

	use mathematical or logical functions, charts and data from all worksheets to convey the results.
8.1.12.A.5	**Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.**
21ST CENTURY LIFE AND CAREER (STANDARD 9)	
CPI #	**CUMULATIVE PROGRESS INDICATOR (CPI)**
9.3.ST-SM.4	**Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.**
9.3.ST.1	**Apply engineering skills in a project that requires project management, process control and quality assurance.**
9.3.ST.2	**Use technology to acquire, manipulate, analyze and report data.**
9.3.ST.3	**Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.**
9.3.ST.4	**Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy.**

MINI UNIT 1A	
Title:	**Biology Basics**
Duration:	**2 Weeks**
Overview:	**Cover the recurring topics of Biology and apply specific theories and hypothesis**

Essential Outcomes - Upon completion of this course students will know (declarative):	Alignment to Standards
How to distinguish between abiotic and biotic factors	LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1
How evolution connects all concepts in biology	LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1
Why cells are limited in size	LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1
How scientists create and test hypotheses	LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1
Various organelles and how they are related to their function	LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1
The relationships between prokaryotic and eukaryotic organisms and how these differences and similarities provide evidence for evolution	LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Describe the cell theory	LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1
Compare and contrast plant and animal cells using a microscope	LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1

Describe the structure and functions of cell organelles	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Explain the importance of size limitations on cells	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Use calculations to determine which cell is more efficient based on surface area to volume ratios	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Utilize the characteristics of life and scientific skills of observation to determine if something is alive or not	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Use a microscope to compare and contrast a prokaryote to a eukaryote	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Explain biological classifications and how organisms are classified	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Identify cell structures based on cellular function	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
All forms of life share common properties	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Cells are the structural and functional units of life	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Evolution explains the unity and diversity of life	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
Eukaryotes evolved from prokaryotes	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**
The unity of life is based on DNA and the common genetic code	**LS1.A: HS-LS1-1, HS-LS1-2 LS4.A: HS-LS4-1**

Scientific method is used to explain phenomenon in nature	**LS1.A: HS-LS1-1, HS-LS1-2** **LS4.A: HS-LS4-1**
Resources Mini Unit 1A:	Unit Notes, Unit Examinations, laboratory equipment

MINI UNIT 1B	
Title:	**Biochemistry**
Duration:	**3 Weeks**
Overview:	**Introduce students to the basics of chemistry and apply concepts to Biology.**

Essential Outcomes - Upon completion of this course students will know (declarative):	**Alignment to Standards**
The bonding properties responsible for creating molecules important for life	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3** **LS1.C: HS-LS1-6, HS-LS1-7**
The unique properties of water	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3** **LS1.C: HS-LS1-6, HS-LS1-7**
The four major macromolecules (carbohydrates, lipids, proteins, nucleic acids) and their importance for life	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3** **LS1.C: HS-LS1-6, HS-LS1-7**
The importance of enzymes in chemical reactions	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3** **LS1.C: HS-LS1-6, HS-LS1-7**
The role of carbon in life's processes	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3** **LS1.C: HS-LS1-6, HS-LS1-7**
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Distinguish between the four classes of organic	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3**

compounds and list their monomers and polymers.	**LS1.C: HS-LS1-6, HS-LS1-7**
Explain how enzymes are substrate specific with emphasis on the structure-function relationship	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Justify the importance of enzymes to biological reactions	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Describe the dominant atoms present in living organisms and give reasons why they are the most common	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Distinguish between the three types of bonds, their relative strengths and functions.	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Define the seven properties of water that make the molecule indispensable to living systems and model how the properties of water are impacted by hydrogen bonding	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Draw and interpret carbon based skeletal diagrams	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Describe the roles of dehydration synthesis and hydrolysis reactions	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
Organisms are composed of elements	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Chemical reactions are responsible for creating and breaking chemical bonds	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
All organic compounds contain carbon	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**

Enzymes speed up chemical reactions which make them essential to life	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
There are four major macromolecules: carbohydrates, lipids, proteins, and nucleic acids	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Water is the most abundant compound in living organisms	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
The unique feature of water make life on Earth possible	**LS1.A: HS-LS1-1, HS-LS3-1, HS-LS1-3 LS1.C: HS-LS1-6, HS-LS1-7**
Resources Mini Unit 1B:	Unit Notes, Unit Examinations, laboratory equipment

MINI UNIT 1C	
Title:	**Cell Connections and Human Body**
Duration:	**3 Weeks**
Overview:	**Introduce students to the way cells regulate the movement of materials across their membranes and therefore maintaining homeostasis despite their environments.**
Essential Outcomes - Upon completion of this course students will know (declarative):	**Alignment to Standards**
The relationship between the structure of inorganic and organic molecules to their function in cellular structure and metabolism	**LS1.A: HS-LS1-1, HS-LS1-2**
The cell is the basic unit of life	**LS1.A: HS-LS1-1, HS-LS1-2**
Cells evolve over time	**LS1.A: HS-LS1-1, HS-LS1-2**
Within the cell there are specialized organelles that	**LS1.A: HS-LS1-1, HS-LS1-2**

carry out specific functions	
Eukaryotes evolved from prokaryotes	**LS1.A: HS-LS1-1, HS-LS1-2**
The cell membrane is a protective layer around the cell and has different modes of transport	**LS1.A: HS-LS1-1, HS-LS1-2**
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Relate the structure of the cell membrane to the fluid mosaic model and how the polarity of water enables phospholipids to create a barrier	**LS1.A: HS-LS1-1, HS-LS1-2**
Describe the different mechanisms for transport of material across a cell membrane	**LS1.A: HS-LS1-1, HS-LS1-2**
Relate the effects of the outside environment on different types of cells	**LS1.A: HS-LS1-1, HS-LS1-2**
Provide evidence for the endosymbiotic theory	**LS1.A: HS-LS1-1, HS-LS1-2**
Compare and contrast chemical and mechanical digestion	**LS1.A: HS-LS1-1, HS-LS1-2**
Predict the direction of of diffused substances across a membrane	**LS1.A: HS-LS1-1, HS-LS1-2**
Compare and contrast the different modes of transport across a membrane	**LS1.A: HS-LS1-1, HS-LS1-2**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
How cells interact with their environment	**LS1.A: HS-LS1-1, HS-LS1-2**
How the human body and organ systems interact with each other	**LS1.A: HS-LS1-1, HS-LS1-2**

Cells are able to survive through active and passive transport materials	**LS1.A: HS-LS1-1, HS-LS1-2**
Resources Mini Unit 1C:	Unit Notes, Unit Examinations, laboratory equipment

UMBRELLA UNIT 2	
Title:	Cellular Biology
Duration:	8 Weeks
Essential Questions:	How do the structures of organisms enable life's functions? How do organisms utilize energy they need to grow and live? How is energy passed through ecosystems? How do organisms interact with the living and non-living environment? How are characteristics from one generation passed on to the next generation? How does DNA relate all organisms on Earth?
Summative Assessments: **(Assessment at the end the learning period)**	Unit Examinations
Formative Assessments: **(Ongoing assessments during the learning period)**	Unit Quizzes (Weekly) Laboratory Assessments Projects
Differentiation:	Modified examinations, scaffolding for questions
TECHNOLOGY STANDARD (STANDARD 8)	
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9.3.ST.2	**Use technology to acquire, manipulate, analyze and report data.**
9.3.ST.3	**Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.**
9.3.ST.4	**Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy.**

MINI UNIT 2A		
Title:	**Energy and Photosynthesis**	
Duration:	**3 Weeks**	
Overview:	**Students will be introduced to the process of photosynthesis and the movement of energy through living systems. Students will also describe the chemical reactions important for photosynthesis.**	
Essential Outcomes - Upon completion of this course students will know (declarative):		**Alignment to Standards**
How energy is transferred through living systems		**LS1.A: HS-LS1-1 LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7 LS2.B: HS-LS2-3**
Why photosynthesis is important to all living organisms		**LS1.A: HS-LS1-1 LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7 LS2.B: HS-LS2-3**

Why enzymes are essential to life on earth	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
How ATP is utilized in cellular reactions	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
How photosynthesis converts light energy to chemical energy	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
How “dark” reactions depend on “light” reactions in plants	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Provide examples of how organisms use feedback mechanisms to maintain their internal environments	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Relate the molecules used/produced during photosynthesis to the molecules used/produced during cellular respiration	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Differentiate between the different types of enzymatic reactions	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Describe the role of ATP and how it functions as a universal shuttle for energy in cells	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Explain the process plants use to convert solar energy into chemical energy and the various	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7**

structures where these processes occur	**LS2.B: HS-LS2-3**
Predict the various factors that can affect the rate of photosynthesis	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
ATP is the molecule that stores energy for use	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Sunlight is essential to keep matter and energy flowing through ecosystems	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Photosynthesis is how plant cells convert light energy into usable chemical energy	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Energy is converted from one form to another as it is transferred between organisms	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Enzymes speed up chemical reactions important for life	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
The experiments and discoveries leading to the theory of photosynthesis	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3**
Resources Mini Unit 2A:	Unit Notes, Unit Examinations, laboratory equipment

MINI UNIT 2B	
Title:	**Cellular Respiration**
Duration:	**2 Weeks**
Overview:	**Students will be introduced to the process of cellular respiration as a means of breaking down glucose into usable energy (ATP). Students will also be able to describe the process of fermentation and when this would occur in animals.**

Essential Outcomes - Upon completion of this course students will know (declarative):	Alignment to Standards
How organic molecules are broken down using cellular respiration.	LS1.A: HS-LS1-1 LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7 LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-7
Why oxygen is important in cellular respiration	LS1.A: HS-LS1-1 LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7 LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-7
How cells generate ATP in the absence of oxygen	LS1.A: HS-LS1-1 LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7 LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-7
The relationship between photosynthesis and cellular respiration	LS1.A: HS-LS1-1 LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7 LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-7
The relationship between calories and cellular respiration	LS1.A: HS-LS1-1 LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7 LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5

	LS2.C: HS-LS2-7
The role ATP plays in a cell's catabolic and anabolic reactions	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
State the equation for cellular respiration	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Describe the role of oxygen as the final electron acceptor in cellular respiration	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Compare and contrast fermentation and respiration and identify when a process will be followed	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Compare and contrast photosynthesis to cellular respiration and identify the link between the two processes	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Relate calories to cellular respiration	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Identify the three main steps of cellular respiration and the products and reactants of each step	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7**

	LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 **LS2.C: HS-LS2-7**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
Cellular respiration is the process that creates ATP	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Organisms have alternate ways to produce energy when oxygen is not present	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
An organism's diet must provide essential nutrients as chemical energy	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Cellular respiration and photosynthesis are complementary processes, each using the others' products as reactants	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Energy flows through ecosystems and is neither created nor destroyed	**LS1.A: HS-LS1-1** **LS1.C: HS-LS1-5, HS-LS1-6, HS-LS1-7** **LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5** **LS2.C: HS-LS2-7**
Resources Mini Unit 2B:	Unit Notes, Unit Examinations, laboratory equipment

MINI UNIT 2C	
Title:	**DNA Replication and Protein Synthesis**
Duration:	**3 Weeks**
Overview:	**Students will be introduced to the structure and function of DNA and will also learn about the scientists that led to the discoveries. Students will then learn about the processes of DNA replication and the role of DNA in protein synthesis.**

Essential Outcomes - Upon completion of this course students will know (declarative):	Alignment to Standards
The structure of DNA and how it reproduces itself	LS1.A: HS-LS1-1 LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3 LS4.A: HS-LS4-1
The scientists leading to the discovery of DNA	LS1.A: HS-LS1-1 LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3 LS4.A: HS-LS4-1
Mutations in DNA can affect an organism and their offspring	LS1.A: HS-LS1-1 LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3 LS4.A: HS-LS4-1
DNA nucleotides are transcribed and translated to construct a protein	LS1.A: HS-LS1-1 LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3 LS4.A: HS-LS4-1
Current areas of debate surrounding DNA (cloning, PCR manipulation, gene therapies, gmo's)	LS1.A: HS-LS1-1 LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3 LS4.A: HS-LS4-1
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Diagram and model the structure of DNA	LS1.A: HS-LS1-1

	LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3 **LS4.A: HS-LS4-1**
Summarize the process of DNA replication	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
List the important experiments and scientists that led to the discovery of DNA and current DNA research	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
Identify issues that may arise with DNA replication and mutations to DNA	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
Describe the steps of protein synthesis	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
Debate the ethical and scientific issues associated with biotechnology	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
All organisms use the same genetic code (DNA) and the same process for constuction amino acid chains (proteins)	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
Genes are sections of DNA that code for proteins	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
DNA replication is a process involving many enzymes	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**

A mutation may affect an organisms offspring is it occurs in a sex cell	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
Gene expression is regulated by the cell	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
Biotechnology is an important debate in society currently	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1 ; LS3.B: HS-LS3-2, HS-LS3-3** **LS4.A: HS-LS4-1**
Resources Mini Unit 2C:	Unit Notes, Unit Examinations, laboratory equipment

UMBRELLA UNIT 3	
Title:	Genetics and Evolution
Duration:	9 Weeks
Essential Questions:	How do the structures of organisms enable life's functions? How are characteristics from one generation passed on to the next generation? How does DNA relate all organisms on Earth? How are so many organisms on Earth related to each other?
Summative Assessments: **(Assessment at the end the learning period)**	Unit Examinations Laboratory Summative Exam
Formative Assessments: **(Ongoing assessments during the learning period)**	Unit Quizzes (Weekly) Laboratory Assessments Projects
Differentiation:	Modified examinations, scaffolding for questions
TECHNOLOGY STANDARD (STANDARD 8)	
CPI #	**CUMULATIVE PROGRESS INDICATOR (CPI)**
8.1.12.A.4	**Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.**
8.1.12.A.5	**Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.**

21ST CENTURY LIFE AND CAREER (STANDARD 9)	
CPI #	**CUMULATIVE PROGRESS INDICATOR (CPI)**
9.3.ST-SM.4	**Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.**
9.3.ST.1	**Apply engineering skills in a project that requires project management, process control and quality assurance.**
9.3.ST.2	**Use technology to acquire, manipulate, analyze and report data.**
9.3.ST.3	**Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.**
9.3.ST.4	**Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy.**

MINI UNIT 3A		
Title:	**Cell Division**	
Duration:	**3 Weeks**	
Overview:	**Students will be introduced to the processes of mitosis and meiosis. Previous knowledge of DNA will be utilized to explain why the process of cellular division is necessary.**	
Essential Outcomes - Upon completion of this course students will know (declarative):		**Alignment to Standards**
How cells produce daughter cells with identical genetic information as parent cells.		**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Why the process of meiosis is necessary to form gametes.		**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**

How genetic information is passed from one generation to the next through sexual reproduction	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
How cancer cells differ from normal cell division	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
How genetic abnormalities occur	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Identify the stages of mitosis and meiosis	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Differentiate between chromosomes, chromatin, chromatids, and homologous chromosomes	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Explain how the cell cycle is regulated	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Distinguish between normal cell division and cancer cells	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Explain the process of gametogenesis and how it relates to DNA replication	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Describe the problems that can arise from abnormal cell growth and defects to the cell cycle	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
Mitosis is the process of somatic cell division, creating genetically identical cells	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Meiosis is the process of gamete cell division, creating genetically different cells	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**

Cell division is maintained through the regulation of cellular processes	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Cancer is caused by unregulated cell division due to internal/external factors	**LS1.A: HS-LS1-1, HS-LS1-2; LS1.B: HS-LS1-4 LS3.A: HS-LS3-1, Hs-LS3-2**
Resources Mini Unit 3A:	Unit Notes, Unit Examinations, laboratory equipment

MINI UNIT 3B	
Title:	**Genetics**
Duration:	**3 Weeks**
Overview:	**Students will first be introduced to the foundations of genetics beginning with Gregor Mendel's work. Students will then further explore modern genetics such as pedigrees, gene therapy, and forensics.**
Essential Outcomes - Upon completion of this course students will know (declarative):	**Alignment to Standards**
Why Mendel is considered the "Father of Genetics"	**LS1.A: HS-LS1-1 LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
How Mendel's choice of pea plants was helpful in his study of genetics	**LS1.A: HS-LS1-1 LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
How Punnett Squares are used to predict the offspring of genetic crosses	**LS1.A: HS-LS1-1 LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Mendel's laws of inheritance	**LS1.A: HS-LS1-1 LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**

Non-Mendelian patterns of inheritance	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
How DNA fingerprinting is used in forensic science	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Summarize Mendel's conclusions about inheritance	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Describe why pea plants were a useful organism to study	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Use a Punnett square to solve genetic crosses	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Explain Mendel's Laws of inheritance	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Describe different patterns of inheritance besides Mendelian inheritance	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Describe modern uses of genetics such as paternity testing, DNA fingerprinting, genetic disease testing, and pedigrees	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
Genes are passed from parents to offspring	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Gregor Mendel built the foundation for modern genetics	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
DNA fingerprinting is commonly used in modern	**LS1.A: HS-LS1-1**

forensics	**LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Genetic disorders can be predicted through pedigrees	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
All traits are controlled by specific alleles	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Modern genetic topics of debate such as GMO's, cloning, and genetic alteration in agriculture	**LS1.A: HS-LS1-1** **LS3.A: HS-LS3-1; LS3.B: HS-LS3-2, HS-LS3-3**
Resources Mini Unit 3B:	Unit Notes, Unit Examinations, laboratory equipment

MINI UNIT 3C	
Title:	**Evolution**
Duration:	**3 Weeks**
Overview:	**Students will be introduced to evolution, first identified by Charles Darwin. Students will study his principles of classification and evidence for evolution.**
Essential Outcomes - Upon completion of this course students will know (declarative):	**Alignment to Standards**
How natural selection provides a mechanism for evolution	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2** **LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3** **LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6** **LS4.D: HS-LS4-7**
Research that led Darwin and others to develop their theories of Evolution	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2** **LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3** **LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6** **LS4.D: HS-LS4-7**
The evidence that supports evolution	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2**

	LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7
Classification based on evolutionary relationships	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Why evolution is a unifying theory in Biology	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
How evolution has played a role in animal behavior	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
The Hardy-Weinberg theorem	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Identify why previous theories of evolution were incorrect	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Describe the pieces of evidence that support evolution	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**

Compare and contrast different structures of related organisms	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Explain why evolution is a unifying theory in biology	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Describe different animal behaviors that were shaped by evolution and the changing environment	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Relate the Hardy-Weinberg theorem to evolution	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
Evolution is a unifying theory in Biology	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
The diversity of life on Earth is explain by natural selection	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
The Hardy-Weinberg theorem shows evolving populations	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**

Current life-forms on Earth evolved from common ancestors	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Mutations are the foundation for evolutionary changes	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Organisms are classified by their common ancestor	**LS1.A: HS-LS1-1; LS2.D: HS-LS2-8; LS3.B: HS-LS3-2 LS4.A: HS-LS4-1; LS4.B: HS-LS4-2, HS-LS4-3 LS4.C: HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5, HS-LS4-6 LS4.D: HS-LS4-7**
Resources Mini Unit 3C:	Unit Notes, Unit Examinations, laboratory equipment

UMBRELLA UNIT 4	
Title:	Ecology
Duration:	12 Weeks
Essential Questions:	How is the Earth so diverse yet there are so many similarities between organisms? How does biodiversity affect humans? How does matter and energy move through ecosystems? How do organisms obtain energy needed to survive? How do the structures of organisms enable life's functions?
Summative Assessments: **(Assessment at the end the learning period)**	Unit Examinations Laboratory Summative Exam
Formative Assessments: **(Ongoing assessments during the learning period)**	Unit Quizzes (Weekly) Laboratory Assessments Projects
Differentiation:	Modified examinations, scaffolding for questions
TECHNOLOGY STANDARD (STANDARD 8)	
CPI #	**CUMULATIVE PROGRESS INDICATOR (CPI)**
8.1.12.A.4	**Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.**
8.1.12.A.5	**Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.**

21ST CENTURY LIFE AND CAREER (STANDARD 9)	
CPI #	**CUMULATIVE PROGRESS INDICATOR (CPI)**
9.3.ST-SM.4	**Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.**
9.3.ST.1	**Apply engineering skills in a project that requires project management, process control and quality assurance.**
9.3.ST.2	**Use technology to acquire, manipulate, analyze and report data.**
9.3.ST.3	**Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.**
9.3.ST.4	**Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy.**

MINI UNIT 4A		
Title:	**Survey of the Kingdoms**	
Duration:	**4 Weeks**	
Overview:	**Students will be introduced to the characteristics that make life possible on Earth. Students will learn why organisms occupy each kingdom and what makes each organism different.**	
Essential Outcomes - Upon completion of this course students will know (declarative):		**Alignment to Standards**
How life on Earth is possible and how life developed from a protocell		**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
How organisms are characterized by scientists		**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3**

	LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6
Plant and animal groups show evolutionary trends	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Why viruses are unique in terms of biotic and abiotic	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
How the kingdoms show increasing evolutionary complexity	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Describe the evolution of organisms in each of the six kingdoms	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Explain the evolutionary milestones for the animal kingdom	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Provide examples of organisms within each of the six kingdoms	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Explain how the evolution of plants and animals show these groups breaking ties with water	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Compare and contrast specific animal behaviors and how they relate to evolution	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Essential Outcomes - Upon completion of this course	**Alignment to Standards**

students will understand (conceptual):	
Viruses do not meet all of the criteria of being biotic	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Animals are classified based on evolutionary characteristics	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Plant complexity is based upon the evolution from aquatic to terrestrial life	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Bacteria can be beneficial or harmful	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Animal complexity is based upon the evolution from aquatic to terrestrial life	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3 LS4.A: HS-LS4-1; LS4.B: HS-LS4-3 LS4.C: HS-LS4-5, HS-LS4-6; LS4.D: HS-LS4-6**
Resources Mini Unit 4A:	Unit Notes, Unit Examinations, laboratory equipment

MINI UNIT 4B	
Title:	**Ecology**
Duration:	**4 Weeks**
Overview:	**Students will be introduced to the ecosystems found on Earth and the interactions of the organisms found in each ecosystem. Students will also expand their knowledge of nutrient cycles on Earth and human impacts on Earth.**

Essential Outcomes - Upon completion of this course students will know (declarative):	Alignment to Standards
The major ecosystems found on Earth	LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6
How the interactions between living organisms and the non-living environment determine the abundance of organisms in an area	LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6
How energy and nutrients are passed through members of a community	LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6
Human activities and their impact on ecosystems and populations	LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6
How ecosystems recover from small and large changes	LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
List the major ecosystems and Biomes on Earth	LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6
Define an ecological niche, and relate competition to evolution	LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6
Use a population pyramid to predict growth	LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6

Predict the impact of human activities and their impact on the environment	**LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6**
Differentiate between primary and secondary succession	**LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
Organisms and their environments are interconnected	**LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6**
Changes in one ecosystem may affect parts of that ecosystem or others	**LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6**
Energy is transferred and matter is cycled through ecosystems	**LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6**
The ecological impact of humans has major consequences for other species	**LS1.A: HS-LS1-2; LS1.C: HS-LS1-5, HS-LS1-7 LS2.A: HS-LS2-1, HS-LS2-2; LS2.B: HS-LS2-3, HS-LS2-4, HS-LS2-5 LS2.C: HS-LS2-2, HS-LS2-6, HS-LS2-7; LS4.D: HS-LS4-6**
Resources Mini Unit 4B:	Unit Notes, Unit Examinations, laboratory equipment

MINI UNIT 4C	
Title:	**Human Body Systems**
Duration:	**4 Weeks**
Overview:	**Students will explore the systems of the human body. Students will also expand their knowledge of**

	certain diseases and disorders that affect humans.
Essential Outcomes - Upon completion of this course students will know (declarative):	**Alignment to Standards**
How human organ systems work together	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
Feedback mechanisms that help maintain homeostasis	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
Current studies on human diseases/disorders	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
The impact of biology on everyday lives	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
Essential Outcomes - Upon completion of this course students will be able to (procedural):	**Alignment to Standards**
Diagram and explain the various body systems	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
Compare and contrast positive and negative feedback systems	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
Relate biology to their everyday lives	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
Describe different diseases and disorders that affect humans	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
Essential Outcomes - Upon completion of this course students will understand (conceptual):	**Alignment to Standards**
Organ systems work together to maintain homeostasis	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
Positive and negative feedback mechanisms are important to maintain essential body functions	**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**

Biology is a dynamic field that changes		**LS1.A: HS-LS1-1, HS-LS1-2, HS-LS1-3; LS1.B: HS-LS1-4**
Resources Mini Unit 4C:	Unit Notes, Unit Examinations, laboratory equipment	

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