Washington Township School District

The mission of the Washington Township Public Schools*is to provide a safe, positive, and progressive educational environment that provides opportunity for all students to attain the knowledge and skills specified in the NJ Learning Standards at all grade levels, so as to ensure their full participation in an ever-changing world as responsible, self-directed and civic-minded citizens.*

Course Title:	**Integrated Science 2**
Grade Level(s):	**10-12**

Duration:	*Full Year:*	**X**	*Semester:*		*Marking Period:*	

Course Description:	**The Integrated Science 2 course is a science course offering wide range coverage of topics in science. The course content includes studies in cell biology, genetics, evolution, plants, animals, and environmental science. The course does not meet the college requirement of a laboratory based science, and is designated a non-lab course.** **The course incorporates lecture, class discussions, cooperative learning activities, small group review, hands-on mini-labs, class demonstrations, and class and student presentations. In addition, student skill development includes note taking and study. Class work lessons, homework, class participation, quiz and test evaluations are used as asessments.** **Lab safety procedures and use of safety equipment in the classroom is are incorporated in Unit One during the first week of school. After this unit of study, a lab safety quiz is given to each student to ensure understanding of all safety procedures. The safety procedures are reinforced and reviewed prior to using any equipment and/or activity throughout the year. A safety contract is signed by each student acknowledging safety rules and regulations in the classroom.** **Students are provided a course syllabus describing the nature of the course, grading criteria, class expectation, class rules, and requirements of the science assignments.**
Grading Procedures:	**Test = 30% Quiz = 20% Independent work = 20%** **Lab Activities = 20% Proficiency Asssessment = 10%**
Primary Resources:	**Next Generation Science Standards, New Jersey Student Learning Standards for Science, New Jersey Model Curriculum for HS Biology** **Glencoe Biology 2017, Mc-Graw Hill.** **Power point presentations and teacher infused video clips.**

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st century skills for College and Career Readiness in a global society

Designed by:	James Weitzman
Under the Direction of:	Dr. Patricia Hughes

Written: __James Weitzman_____

Revised: _____

BOE Approval: _____

Unit One: **Interdependence Relationships and Ecosystems**

Unit Description:

In this unit students will explore an introduction to biology and a review of lab safety. Students will construct explanations for the role of energy in the cycling of matter in organisms and ecosystems. They will apply mathematical concepts to develop evidence to support explanations of the interactions of photosynthesis and cellular respiration, and they will develop models to communicate these explanations. Students also will understand organisms' interactions with each other and their physical environment and how organisms obtain resources. Students will utilize the crosscutting concepts of matter and energy and systems, and system models to make sense of ecosystem dynamics. Students are expected to use construct explanations for the role of energy in the cycling of matter through organisms and ecosystems. They will apply mathematical concepts to develop evidence to support explanations and demonstrate their understanding of the disciplinary core ideas.

Unit Duration: Unit 1 5 weeks

-LSDesiredResults

Standard(s):HS-LS2-1 HS-LS2-2 HS-LS2-6

Indicators:

LS2A Interdependent Relationships in Ecosystems

LS2C Ecosystem Dynamics, Functioning, and Resilience

LS2D Social Interactions and Group Behavior

Understandings:

LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carryingcapacity of ecosystems at different scales.

LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affectingbiodiversity and populations in ecosystems of different scales.

LS2-6 Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relativelyconsistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

LS2-8 Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

Essential Questions:

How do organisms interact with the living and nonliving environments to obtain matter and energy?

How is a line graph of population growth and decline interpreted?

Explain why populations grow and decline over time?

When they relocate bears, wolves, or other predators, how is the ability to survive determined?

What limits the number and types of different organisms that live in one place?

Assessment Evidence	
PerformanceTasks: Written Chapter Tests Projects Student Webquests Students Independent Work Written Quizzes on content vocabulary Written Quizzes on Lab Activities Lab Activitity participation and accuracy of the results of task completion	**OtherEvidence:** Specific Research Projects for students either working collectively with others or independently. Lab activities that demonstrate several organism's in relation to their diverse environments. Written assessments by students to illustrate the complexity of ecology. Written assessments either formally or informally of student knowledge of the content. Textbook essential supplemental activities, main conceptual points, formal assessments, and textbook generated animation content. Appropriate models and demonstrations. Proper use of equipment: scales, balances, microscopes, and other instrumentation when needed. LabPro® instrumentation and laptops as applicable. Webquest research of content topics.

Benchmarks:

Successful completion of written tests and quizzes. Completion of lab activities.

LearningPlan

LearningActivities:

Student oriented Independent work including classroom activies and work outside of the classroom.
Students will participate in daily warm up review questions.
Students will review key terms and all unit vocabulary.
Students will prepare for announced and unannounced vocabulary quizzes.
Recording notes and discussing classroom power point presentation information.
Written assessment of video clips viewed by students on the content topics.
Hands-on Lab Activities including student partnerships or working independently on a given content topic.
Independent writing assignments.

Resources: **Textbook sources**
Internet resources
Lab material resources
Teacher collaboration in ICS setting

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): LS2-1	
4.0	**Students will be able to:** Create a mathematical representation based on population growth data and describe the causes and variations in carrying capacity at different scales.
3.0	**Students will be able to:** Interpret a mathematical representation of population growth and list factors affecting carrying capacity at different scales.
2.0	**Students will be able to**: Describe factors that limit carrying capacity and understand a population growth graph.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** Describe: resources, climate, carrying capacity, biotic factors, abiotic factors, limiting factors, or mathematical representations of population growth.
0.0	**Even with help, no success** I cannot yet describe: resources, climate, carrying capacity, biotic factors, abiotic factors, limiting factors, or mathematical representations of population growth.

Standard(s): LS 2-2	
4.0	**Students will be able to:** Develop a mathematical representation of an ecosystems biodiversity given a change in the environment. I can revise my claim if a fluctuation occurs within a population.
3.0	**Students will be able to:** Interpret a mathematical representation of population growth and list factors affecting carrying capacity at different scales.
2.0	**Students will be able to:** Describe factors that limit carrying capacity and understand a population growth graph.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** Describe: resources, climate, carrying capacity, biotic factors, abiotic factors, limiting factors, or mathematical representations of population growth.
0.0	**Even with help, no success** I cannot yet interpret data to explain how different factors can affect biodiversity within an ecosystem.

Standard(s): LS2-6	
4.0	**Students will be able to:** Develop a strategy to increase or decrease the numbers of a given population. I can use scientific evidence to predict how the strategy will affect the populations in an ecosystem.
3.0	**Students will be able to:** Use evidence to show that populations in a specific ecosystem tend to remain stable unless conditions change, in which case a new ecosystem may result.
2.0	**Students will be able to:** Explain how certain environmental factors can cause a population's numbers to increase or decrease.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** List the factors that can cause a population to increase or decrease.
0.0	**Even with help, no success** I cannot yet list factors that cause population numbers to increase or decrease.

Unit Modifications for Special Population Students	
Advanced Learners	N/A
Struggling Learners	Extended time and review assessments Implement IEP and 504 modifications
English Language Learners	Utilize ESL learning assistance Extended time and review assessments
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504 Refer to page four in the	

	Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.	

Interdisciplinary Connections
Indicators: **ELA/Literacy –RST.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.** **(HS-LS2-6),(HS-LS2-7),(HS-LS2-8)** **RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS2-1),(HS-LS2-2),(HS-LS2-3),(HS-LS2-6),(HS-LS2-8)** **RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-LS2-6),(HS-LS2-7),(HS-LS2-8)** **RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-LS2-6),(HS-LS2-7),(HS-LS2-8)** **WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS2-1),(HSLS2-**

2),(HS-LS2-3)

Mathematics –
MP.2 Reason abstractly and quantitatively. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-6),(HS-LS2-7)
MP.4 Model with mathematics. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4)
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSS-ID.A.1 Represent data with plots on the real number line. (HS-LS2-6)
HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. HSS-IC.B.6 Evaluate reports based on data. (HS-LS2-6) n. (HS-LS2-6)

Integration of 21st Century Skills

Indicators:

Appropriate and contemporary technologies will be applied throughout the unit to practice 21st century skills.

Unit Two: Matter and Energy : Transformation in Ecosystems

In this unit of study, students construct explanations for the role of energy in the cycling of matter in organisms and ecosystems. They apply mathematical concepts to develop evidence to support explanations of the interactions of photosynthesis and cellular respiration, and they will develop models to communicate these explanations. Students also understand organisms' interactions with each other and their physical environment and how organisms obtain resources. Students utilize the crosscutting concepts of matter and energy and systems, and system models to make sense of ecosystem dynamics. Students are expected to use students construct explanations for the role of energy in the cycling of matter in organisms and ecosystems. They apply mathematical concepts to develop evidence to support explanations as they demonstrate their understanding of the disciplinary core ideas.

Unit Duration: Unit 2 6 weeks

DesiredResults

Standard(s):HS-LS1-5, HS-LS-6, HS-LS2-3

Indicators: Cycles of Matter and Energy

LS1B

LS1C

Understandings:

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-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

EssentialQuestions:

How do matter and energy cycle through ecosystems?

How can the processes of photosynthesis and respiration in a cell impact ALL of Earth's systems?

How do the chemical equations of photosynthesis and cell respiration relate to each other?

What are the reactants and products of photosynthesis and cell respiration ?

Mathematically balance the chemical equations of both photosynthesis and cell respiration.

Explain how the carbon, nitrogen, and water cycles function and affect ecosystems.

Define and explain the difference between aerobic and anaerobic environments.

Explain the elements and chemical compounds essential for life, including acids and bases.

Assessment Evidence

PerformanceTasks:

Written Chapter Tests

Projects such as student Webquests

Students Independent Work

Written Quizzes on content vocabulary

Written Quizzes on Lab Activities

Lab Activitity participation and accuracy of the results of task completion

OtherEvidence:

Projects for students requiring specific research working collectively with others or independently

Written assessmens by students to illustrate the significance of energy through the ecosystem.

Explain the main source of energy and why it applies to all organisms on Earth.

Conduct a chemical lab to compare acids and bases.

	Textbook essential supplemental activities, main conceptual points, formal assessments, and textbook generated animation content. Written assessments either formally or informally of student knowledge of the content. Appropriate models and demonstrations. Proper use of equipment: scales, balances, microscopes, and other instrumentation when needed. LabPro® instrumentation (pH probes) and laptops as applicable. Webquest research of content topics.

Benchmarks:

Successfully completing written tests and quizzes. Completion of lab activities.

LearningPlan

LearningActivities:

Student oriented independent work including classroom activies and work outside of the classroom.
Students will participate in daily warm up review questions.
Students will review key terms and all vocabulary on the subject matter.
Students will be prepared for announced and unannounced vocabulary quizzes.
Recording notes and discussing classroom power point presentation information.
Written assessment of video clips viewed by students on the content studied.
Hands-on Lab Activities including student partnerships or working independently on a given subject matter.
Independent writing assignments on a given subject

Resources: **Textbook sources**
Internet resources

Lab material resoures
Teacher collaboration in the ICS setting

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): **HS-LS1-5**	
4.0	**Students will be able to:** Apply a model of photosynthesis to explain a variety of biological phenomena.
3.0	**Students will be able to:** Use a model to demonstrate how photosynthesis transforms light energy into stored chemical energy.
2.0	**Students will be able to:** Identify the reactants and products of photosynthesis. Recognize the difference between light energy and chemical energy.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** Recognize that water, carbon dioxide, oxygen, and sugars are involved in the process of photosynthesis, but I cannot yet explain how.
0.0	Even with help, no success I cannot yet identify the reactants and products of photosynthesis. I cannot yet recognize the difference between light energy and chemical energy.

Standard(s): HSLS-1-6	
4.0	**Students will be able to:** Rearrange the atoms of one monomer to construct new monomers, and account foradditional elements (e.g. sulfur, nitrogen, phosphorus) that are needed from other sources, or elements which are left over.
3.0	**Students will be able to:** Explain how the carbon, hydrogen and oxygen from sugar moleculescan combine with other elements to form amino acids and/or other carbon-based molecules. I can explain that chemical reactions involve changes in the energy involved.
2.0	**Students will be able to:** Draw the structural formulas for the monomers of organic molecules (e.g. glucose, amino acids, fatty acids, nucleotides).
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can identify the bonding patterns of carbon, hydrogen and oxygen atoms, and recognize the structural formulas for the monomers of organic molecules.
0.0	**Even with help, no success** I cannot yet identify the bonding patterns of carbon, hydrogen and oxygen atoms, or recognize the structural formulas for the monomers of organic molecules.

Standard(s): HS-LS2-3	
4.0	**Students will be able to:** Construct an explanation based on evidence connecting the cycling of specific chemical elements to the flow of energy in all conditions.
3.0	**Students will be able to:** Construct an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
2.0	**Students will be able to:** Recognize the connection between matter and energy in organisms and within ecosystems.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can define photosynthesis, cellular respiration, aerobic, anaerobic, flow of energy, and cycling of matter.
0.0	**Even with help, no success** I cannot yet define photosynthesis, cellular respiration, aerobic, anaerobic, flow of energy, or cycling of matter.

Unit Modifications for Special Population Students	
Advanced Learners	N/A
Struggling Learners	Extended time and review assessments Implement IEP and 504 modifications
English Language Learners	Utilize ESL learning assistance Extended time and review assessments
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504 Refer to page four in the Parent and	

	Educator Guide to Section 504 to assist in the development of appropriate plans.	

Interdisciplinary Connections

Indicators:
ELA/Literacy –RST.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
(HS-LS2-6),(HS-LS2-7),(HS-LS2-8)
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS2-1),(HS-LS2-2),(HS-LS2-3),(HS-LS2-6),(HS-LS2-8)
RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-LS2-6),(HS-LS2-7),(HS-LS2-8)
RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-LS2-6),(HS-LS2-7),(HS-LS2-8)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS2-1),(HSLS2-2),(HS-LS2-3)

Mathematics –
MP.2 Reason abstractly and quantitatively. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-6),(HS-LS2-7)
MP.4 Model with mathematics. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4)
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSS-ID.A.1 Represent data with plots on the real number line. (HS-LS2-6)
HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. HSS-IC.B.6 Evaluate reports based on data. (HS-LS2-6) n. (HS-LS2-6)

Integration of 21st Century Skills

Indicators:

Appropriate and contemporary technologies will be applied throughout the unit to practice 21st century skills.

Unit Five: **Human Activity and the Biosphere**

Unit Description:

In this unit of study, students examine factors that have influenced the distribution and development of human society; these factors include climate, natural resource availability, and natural disasters. Students use computational representations to analyze how earth systems and their relationships are being modified by human activity. Students also develop an understanding of how human activities affect natural resources and of the interdependence between humans and Earth's systems, which affect the availability of natural resources. Students will predict how engineering capabilities may reduce human impacts on earth systems and improve social and environmental cost–benefit ratios. The crosscutting concepts of cause and effect, systems and systems models, stability and change, and the influence of engineering, technology, and science on society and the natural world are identified as organizing concepts for the disciplinary core ideas. Students will analyze and interpret data, use mathematical and computational thinking, and construct explanations as they

demonstrate understanding of the disciplinary core ideas.

Unit Duration: Unit 3 6 weeks

DesiredResults

Standard(s): HS-LS4-6, HS-LS2-7

Indicators:

LS4D : Biodiversity and Humans

Understandings:

Students examine factors that have influenced the distribution and development of human society; these factors include climate, natural resource availability, and natural disasters.

Students use computational representations to analyze how earth systems and their relationships are being modified by human activity.

Students develop an understanding of how human activities affect natural resources and of the interdependence between humans and Earth's systems, which affect the availability of natural resources.

Students apply engineering concepts to reduce human impacts on earth systems and improve social and environmental cost–benefit ratios.

The crosscutting concepts of cause and effect, systems and systems models, stability and change, and the influence of engineering, technology, and science on society and the natural world are identified.

Students will analyze and interpret data, use mathematical and computational thinking, and construct explanations as they demonstrate understanding of the disciplinary core ideas.

EssentialQuestions:

How do humans depend on Earth's resources?

How and why do humans interact with their environment and what are the effects of these interactions?

What does scientific evidence show about human activities and effects on the organisms of an ecosystem?

What is the current rate of global or regional climate change and what are the associated future impacts to Earth's systems?

Give examples of how some organisms adapt and divergve based upon human activity changes to the environment.

Explain that natural cycles of global climate change and give several examples that factor into this cyclic change in weather and climate.

Assessment Evidence

PerformanceTasks:

Written Chapter Tests

Projects such as student Webquests

OtherEvidence:

Specific Research Projects for students either working collectively with others or independently.

Written assessmens by students to illustrate the

Students Independent Work Written Quizzes on content vocabulary Written Quizzes on Lab Activities Lab Activitity participation and accuracy of the results of task completion	significance of the human impact on earth's resources and it's organisms. Anaylze and interpret data on human impact on the planet. Written assessments either formally or informally of student knowledge of the content. Textbook essential supplemental activities, main conceptual points, formal assessments, and textbook generated animation content. Written assessments either formally or informally of student knowledge of the content. Appropriate models and demonstrations. Proper use of equipment: scales, balances, microscopes, and other instrumentation when needed. LabPro® instrumentation and laptops as applicable. Webquest research of content topics.

Benchmarks:

Successfully completing written tests and quizzes. Compleion of lab activites.

LearningPlan

LearningActivities:
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Independent writing assignments on a given subject

Resources: **Textbook sources**
Internet resources
Lab material resoures
Teacher collaboration in the ICS setting

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): **HS-LS4-6**	
4.0	**Students will be able to:** Create and propose new methods for reducing the negative impacts human activities have on the biodiversity of ecosystems.
3.0	**Students will be able to:** When I encounter multiple solutions designed to reduce human impact on biodiversity, I can develop a model to test which solution is most effective.
2.0	**Students will be able to:** Use examples of measured data to show how some human activities adversely affect biodiversity in ecosystems.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can describe how some human activities can negatively affect ecosystems.
0.0	**Even with help, no success** I cannot yet describe how some human activities can negatively affect ecosystems.

Standard(s): HS-LS2-5	
4.0	**Students will be able to:** Use my model to predict the impact of changes in the rates of photosynthesis or cellular respiration on Earth's biosphere, atmosphere, hydrosphere, and geosphere.
3.0	**Students will be able to:** Develop a model that illustrates the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
2.0	**Students will be able to:** Use chemical equations to describe how the element carbon cycles through the processes of photosynthesis and cellular respiration.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can define the following terms: photosynthesis, cellular respiration, reactant, product, biosphere, atmosphere, hydrosphere, and geosphere.
0.0	**Even with help, no success** I cannot yet define the following terms: photosynthesis, cellular respiration, reactant, product, biosphere, atmosphere, hydrosphere, or geosphere.

Standard(s): HS-LS2-7	
4.0	**Students will be able to:** Plan and carry out an investigation to provide evidence that will allow me to compare, evaluate and refine multiple solutions for reducing the impacts of human activities on the environment and biodiversity
3.0	**Students will be able to:** Design, evaluate and refine a solution for reducing the impacts of human activities on the environment and biodiversity under a variety of conditions.
2.0	**Students will be able to:** Evaluate a possible solution for reducing the impacts of human activities on the environment and biodiversity.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can recognize some possible impacts of human activities on the environment and biodiversity. I can define the following terms: overpopulation, overexploitation, habitat destruction, pollution, invasive species, and climate change.
0.0	**Even with help, no success** I cannot yet define the following terms: overpopulation, overexploitation, habitat destruction, pollution, invasive species, or climate change.

Unit Modifications for Special Population Students	
Advanced Learners	N/A
Struggling Learners	Extended time and review assessments Implement IEP and 504 modifications
English Language Learners	Utilize ESL learning assistance Extended time and review assessments
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a Refer to page four in the	

504	Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.	

Interdisciplinary Connections
Indicators: **ELA/Literacy –RST.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.** **(HS-LS2-6),(HS-LS2-7),(HS-LS2-8)** **RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS2-1),(HS-LS2-2),(HS-LS2-3),(HS-LS2-6),(HS-LS2-8)** **RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-LS2-6),(HS-LS2-7),(HS-LS2-8)** **RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-LS2-6),(HS-LS2-7),(HS-LS2-8)** **WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS2-1),(HSLS2-2),(HS-LS2-3)** **Mathematics –**

MP.2 Reason abstractly and quantitatively. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-6),(HS-LS2-7)
MP.4 Model with mathematics. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4)
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSS-ID.A.1 Represent data with plots on the real number line. (HS-LS2-6)
HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. HSS-IC.B.6 Evaluate reports based on data. (HS-LS2-6) n. (HS-LS2-6)

Integration of 21st Century Skills

Indicators:

Appropriate and contemporary technologies will be applied throughout the unit to practice 21st century skills.

Unit Three: **Cells and Cell Speialization**

Unit Description:

How do the structures of organisms enable life's functions? Students investigate explanations for the structure and function of cells as the basic unit of life, of hierarchical organization of interacting organ systems, and of the role of specialized cells for maintenance and growth. The crosscutting concepts of structure and function, matter and energy, and systems and system models are called out as organizing concepts for the disciplinary core ideas. Students use critical reading, modeling, and conducting investigations. Students also use the science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Unit Duration: Unit 4 6 weeks

DesiredResults

Standard(s): HS-LS1-2 HS-LS1-3

Indicators:

LS1A

LS1B

Understandings:

LS1A :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 cel

LS1.B: Growth and Development of Organisms

EssentialQuestions:

How does the structure of DNA determine the structure of proteins, and what is the function of proteins?

Define and determine the main function of cell organelles.

How are cell organelles of plants different from organelles of an animal cell?

Compare and contrast the cell membrane (plasma membrane) and cell wall.

Describe the Cell Cycle.

How do cells duplicate and why is it necessary for cells to duplicate?

Explain what major chemical compound is responsible for directing cell activities.

Describe in detail the phases of both mitosis and meiosis.

Explain why the processes of mitosis and meiosis are important to living organisms.

Describe the potential results of point and chromosome mutations within a cell or organism.

Explain and describe the types of chemical transport throughout a cell.

Compare and contrast diffusion and osmosis via a lab activity.

Give specific examples of chemicals able to diffuse through a cell membrane.

Assessment Evidence

PerformanceTasks:

Written Chapter Tests

Projects such as student Webquests

OtherEvidence:

Projects for students either Specific Research working collectively with others or independently

Students Independent Work Written Quizzes on content vocabulary Written Quizzes on Lab Activities Lab Activitity participation and accuracy of the results of the completed task	Written assessments by students to illustrate the results and significance of active and passive transfer. Explain why the function of every cell organelle is essential to the cell's operation. Conduct a diffusion / osmosis lab to demonstrate transport through a cell membrane. Conduct a lab utilizing a compound light microscope to examine several organelles of both plant and animal cells. Compare and contrast the quality and capability of a compound light microscope with a stereoscope. Written assessments either formally or informally of student knowledge of the content. Identify and explain the structure and functions of the parts of both plant and animal cells. Textbook essential supplemental activities, main conceptual points, formal assessments, and textbook generated animation content. Appropriate models and demonstrations. Proper use of equipment: scales, balances, microscopes, and other instrumentation when needed. LabPro® instrumentation and laptops as applicable. Webquest research of content topics.

Benchmarks:

Successfully completing written tests and quizzes. Completion of lab activities.

LearningPlan

LearningActivities:

Student oriented independent work including classroom activies and work outside of the classroom.
Students will participate in daily warm up review questions.
Students will review key terms and all vocabulary on the subject matter.
Students will be prepared for announced and unannounced vocabulary quizzes.
Recording notes and discussing classroom power point presentation information.
Written assessment of Video clips viewed by students on the content studied.
Hands-on Lab Activities including student partnerships or working independently on a given subject matter.
Independent writing assignments on a given subject.

Resources:

Textbook sources
Internet resources
Lab material resoures
Teacher collaboration in the ICS setting

Unit Learning Goal and Scale

(Level 2.0 reflects a minimal level of proficiency)

Standard(s):
HS-LS1-2

4.0	**Students will be able to:** Compare and contrast how different organisms, living in different environments, can use different kinds of cells, tissues and organisms to carry out similar functions.
3.0	**Students will be able to:** Create and use a model to show how the cells, tissues and organs in various body systems

	interact to provide specific functions (e.g. movement, uptake of nutrients, temperature regulation, etc.) within an organism.
2.0	**Students will be able to:** Describe the major functions of various tissues, organs and organ systems in an organism.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can define the terms: cell, tissue, organ, organ system, and organism.
0.0	**Even with help, no success** I cannot yet define the terms: cell, tissue, organ, organ system, and organism.

Standard(s): HS-LS1-3	
4.0	**Students will be able to:** Propose my own research question about homeostasis in organisms. I can use that question to design an experiment in which some variables are measured, some variables are manipulated, and some are kept constant. I can use experimental data to propose a model which explains a feedback mechanism used to maintain homeostasis. I can use this model to make predictions for other experiments.
3.0	**Students will be able to:** Plan and do an experiment that provides evidence (i.e. data) to support the claim that feedback mechanisms help an organism keep a fairly constant internal environment.
2.0	**Students will be able to:** Describe how different body structures or body systems work together to help an organism respond to changing conditions (e.g. cold or drought) and still maintain a fairly constant internal environment.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can define the term homeostasis and identify several internal conditions in plants and animals that are kept fairly constant.
0.0	**Even with help, no success** I am not yet able to define the term homeostasis. I cannot yet identify the internal conditions in plants and animals that are kept fairly constant.

Standard(s): HS-LS1-1	
4.0	**Students will be able to:** Differeniate cell types among higher level organisms and explain their role or function.
3.0	**Students will be able to:** Understand the different processes of cell organelles between plant and animal cells and the nessescity for homeostasis in a cell environment.
2.0	**Students will be able to:** Have and understanding why cell membranes / plasma membranes and cell wall differ and for what purpose.

1.0	**With help, partial success at level 2.0 content and level 3.0 content**: I can not the different functions between different organelles in plant and animale cells.
0.0	**Even with help, no success** ; I do not know the role of DNA in operation of cell organelles within plant or animal cells.

Unit Modifications for Special Population Students	
Advanced Learners	N/A
Struggling Learners	Extended time and review assessments Implement IEP and 504 modifications
English Language Learners	Utilize ESL learning assistance Extended time and review assessments
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504 Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.	

Interdisciplinary Connections

Indicators:
ELA
RST.11-12.1
Cite specific textual evidence
to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
(HS-LS3-1),(HS-LS3-2)
RST.11-12.9
Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
(HS-LS3-1)
WHST.9-12.1
Write arguments focused on discipline-specific content.
(HS-LS3-2

Mathematics –
MP.2 Reason abstractly and quantitatively. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-6),(HS-LS2-7)
MP.4 Model with mathematics. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4)
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSS-ID.A.1 Represent data with plots on the real number line. (HS-LS2-6)
HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. HSS-IC.B.6 Evaluate reports based on data. (HS-LS2-6) n. (HS-LS2-6)

Integration of 21st Century Skills

Indicators:

Appropriate and contemporary technologies will be applied throughout the unit to practice 21st century skills.

Unit Four: DNA and Inheritance

Unit Description:

Students analyze data develop models to make sense of the relationship between DNA and chromosomes in the process of cellular division, which passes traits from one generation to the next. Students determine why individuals of the same species vary in how they look, function, and behave. Students develop conceptual models of the role of DNA in the unity of life on Earth and use statistical models to explain the importance of variation within populations for the survival and evolution of species. Ethical issues related to genetic modification of organisms and the nature of science are escribed. Students explain the mechanisms of genetic inheritance and describe the environmental and genetic causes of gene mutation and the alteration of gene expressions. The crosscutting concepts of structure and function, patterns , and cause and effect are used as organizing concepts for the disciplinary core ideas. Students also use science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Unit Duration: Unit 5 6 weeks

DesiredResults

Standard(s): HS-LS1-1, HS-LS1-4, HS-LS3-1, HS-LS3-2, HSLS3-3

Indicators: LS1A
LS1B
LS3A

Understandings:

Students analyze data develop models to make sense of the relationship between DNA and chromosomes in the process of cellular division.

Students determine why individuals of the same species vary in how they look, function, and behave.

Students develop conceptual models of the

EssentialQuestions:

How are characteristics from one generation related to the previous generation?

Explain the structure of DNA and RNA.

Describe the roles of both DNA and RNA.

Explain how a gene is associated with the “code” in a strand of DNA.

role of DNA in the unity of life on Earth and use statistical models to explain the importance of variation within populations for the survival and evolution of species. Ethical issues related to genetic modification of organisms and the nature of science are discussed and considered. Students explain the mechanisms of genetic inheritance and describe the environmental and genetic causes of gene mutation and the alteration of gene expressions. The crosscutting concepts of structure and function patterns, and cause and effect are used as organizing concepts for the disciplinary core ideas. Students also use the science and engineering practices to demonstrate understanding the disciplinary core ideas.	Describe how a protein is synthesized using DNA and RNA. Explain how chromatin, chromosomes and DNA are related in the stage of protein synthesis, DNA replication and cell division. Describe how and why proteins play a critical role for an organism. Show the simialrities of DNA among all living things. Relate Mendelian genetics to current knowledge. Explain that changing the DNA code changes the organisms trait. Explain how DNA and the traits acquired are passed from generation to generation. Lab Activity: Construct a representation of a DNA molecule.

Assessment Evidence

PerformanceTasks:	**OtherEvidence:**
Written Chapter Tests Projects such as student Webquests Students Independent Work Written Quizzes on content vocabulary Written Quizzes on Lab Activities Lab Activitity participation and accuracy of the results from the completed task	Projects for students either Specific Research working collectively with others or independently Written assessments by students to illustrate the significance of DNA and mutations. Utilize and create models of DNA Written assessments either formally or informally of student knowledge of the content. Textbook essential supplemental activities, main conceptual points, formal assessments, and textbook generated animation content. Written assessments either formally or informally of student knowledge of the content.

	Appropriate models and demonstrations. Proper use of equipment: scales, balances, microscopes, and other instrumentation when needed. LabPro® instrumentation and laptops as applicable. Webquest research of content topics.

Benchmarks:

Successfully completing written tests and quizzes. Completion of Lab Activities.

LearningPlan

LearningActivities:

Student oriented Independent work including classroom activies and work outside of the classroom.
Students will participate in daily warm up review questions.
Students will review key terms and all vocabulary on the subject matter.
Students will be prepared for announced and unannounced vocabulary quizes.
Recording notes and discussing classroom power point presentation information.
Written assessment of video clips viewed by students on the content studied.
Hands-on Lab Activities including student partnerships or working independently on a given subject matter.
Independent writing assignments on a given subject

Resources: **Textbook sources**
Internet resources
Lab material resoures
Teacher collaboration in the ICS setting

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): **HS-LS1-1**	
4.0	**Students will be able to:** Explain how DNA structure relates to the structure of proteins for gene expression through the use of codon/amino acid relationships.
3.0	**Students will be able to:** Use a model to explain why DNA is first transcribed into RNA instead of directly into a protein and then translated into proteins through gene expression.
2.0	**Students will be able to:** Use a model to show DNA structure (base pairs and nucleotides) and how it can be used as a template for replication or gene expression.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can define DNA, gene, and expression.
0.0	**Even with help, no success** I cannot yet define "DNA, gene, and expression" I cannot yet describe how proteins are created from the template of DNA.
Standard(s): **HS-LS1-4**	
4.0	**Students will be able to:** Explain the environmental and genetic factors that cause certain types of cells (e.g. muscle cells) to develop in complex organisms.
3.0	**Students will be able to:** Design and use a model (drawing, structure, virtual) to show how cell division (mitosis) produces the complex variety of cells in an organism.
2.0	**Students will be able to:** Use a model (drawing, structure, virtual) to describe how cells divide by mitosis.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can define mitosis, chromosome, and differentiation. I can recognize and label a diagram showing the process of cell division.
0.0	**Even with help, no success** I cannot yet define mitosis, chromosome, or differentiation. I cannot yet describe how cells divide.

Standard(s): HS-LS3-1	
4.0	**Students will be able to:** Use answers to my clarifying questions to refine an explanation of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
3.0	**Students will be able to:** Pose clarifying questions about the relationships between: • DNA and chromosomes; • chromosomes and the traits for which they code; and • the traits of parents and the traits of offspring.
2.0	**Students will be able to:** Examine a diagram or model to ask questions about the relationships between DNA, chromosomes, and thetraits of a variety of organisms.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can describe DNA, chromosomes, traits, and offspring. I can begin to form questions about the relationships between them.
0.0	**Even with help, no success** I cannot yet describe DNA, chromosomes, traits,or offspring. I cannot yet begin to form questions about the relationships between them.

Standard(s): HS-LS3-2	
4.0	**Students will be able to:** Develop a research question in order to investigate various mechanisms of mutations caused by environmental factors.
3.0	**Students will be able to:** Make and defend a claim regarding the causes of inheritable genetic variations using evidence such as: • New genetic combinations through meiosis • Viable errors occurring during replication, and/or • Mutations caused by environmental factors.
2.0	**Students will be able to:** Explain how meiosis, replication errors, and mutations due to environmental factors can influence genetic inheritance.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can describe what a genetic mutation is and I can begin to form questions about how they are caused.
0.0	**Even with help, no success** I cannot yet describe how genetic variations occur.

Standard(s): HS-LS3-3	
4.0	**Students will be able to:** Research a population and can make a prediction using real world data on future distribution of traits.
3.0	**Students will be able to:** Analyze and interpret data in order to explain the variation and distribution of expressed traits in a population. I can describe the probability of trait expression as it relates to genetic and environmental factors.
2.0	**Students will be able to:** Recognize patterns in trait expression within a population and can interpret data to determine the probability of trait occurrence within a population.

1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can recognize patterns in trait expression within a population, but I cannot yet determine the probability of trait expression.
0.0	**Even with help, no success** I cannot yet explain how variation and distribution of traits depend on both genetic and environmental factors.

Unit Modifications for Special Population Students	
Advanced Learners	N/A
Struggling Learners	Extended time and review assessments Implement IEP and 504 modifications
English Language Learners	Utilize ESL learning assistance Extended time and review assessments
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504 Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.	

Interdisciplinary Connections

Indicators:
ELA
RST.11-12.1
Cite specific textual evidence to support analysis of science and technical text s, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
(HS-LS3-1),(HS-LS3-2)
RST.11-12.9
Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
(HS-LS3-1)
WHST.9-12.1
Write arguments focused on discipline-specific content.
(HS-LS3-2

Mathematics –
MP.2 Reason abstractly and quantitatively. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-6),(HS-LS2-7)
MP.4 Model with mathematics. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4)
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSS-ID.A.1 Represent data with plots on the real number line. (HS-LS2-6)
HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. HSS-IC.B.6 Evaluate reports based on data. (HS-LS2-6) n. (HS-LS2-6)

Integration of 21st Century Skills

Indicators:

Appropriate and contemporary technologies will be applied throughout the unit to practice 21st century skills.

Unit Six: Natural Selection

Unit Description:

Students constructing explanations and designing solutions,analyzingand interpreting data, and engaging in argument from evidenceinvestigateto make sense of the relationship between

the environment and natural selection. Students also develop an understanding of the factors causing natural selection of species over time. They also demonstrate and understand how multiple lines of evidence contribute to the strength of scientific theories of natural selection. The crosscutting concepts of patterns and cause and effect serve as organizing concepts for the disciplinary core ideas. Students also use the science and engineering practices to demonstrate understanding of the disciplinary core ideas.This unit is based on Disciplinary Core Idea LS4.C.

Unit Duration: Unit 6 4 weeks

DesiredResults

Standard(s): HS-LS4-3 HS-LS4-4

Indicators:

LS4B

LS4C

Understandings:

HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

EssentialQuestions:

Explain Charles Darwin's theory on natural selection.

Give examples of change used by Darwin on natural selection.

Explain several factors that can influence change in an organism's DNA as a result of the natural selection process.

Give several reasons why scientists believe that natural selection will assist in an organism's chances to survive and reproduce.

List several human factors which could interfere or disrupt the natural selection process.

Students analyze and interpret data that may suggest anthropological factors may have changed the process of natural selection.

Assessment Evidence

PerformanceTasks:

Written Chapter Tests

OtherEvidence:

Projects for students either Specific Research working collectively with others or independently Lab activities that demonstrate natural selection

Projects such as student Webquests Students Independent Work Written Quizzes on content vocabulary Written Quizzes on Lab Activities Lab Activity participation and accuracy of the results of completion of the task	of some organisms. Written assessments by students to illustrate the significance of natural selection. Written assessments either formally or informally of student knowledge of the content. Textbook essential supplemental activities, main conceptual points, formal assessments, and textbook generated animation content. Written assessments either formally or informally of student knowledge of the content. Appropriate models and demonstrations. Proper use of equipment: scales, balances, microscopes, and other instrumentation when needed. LabPro® instrumentation and laptops as applicable. Webquest research of content topics.

Benchmarks:

Successfully completing written tests and quizzes. Completion of lab activities.

LearningPlan

LearningActivities:

Student oriented independent work including classroom activies and work outside of the classroom.
Students will participate in daily warm up review questions.
Students will review key terms and all vocabulary on the subject matter.
Students will be prepared for announced and unannounced vocabulary quizzsess.
Recording notes and discussing classroom power point presentation information.
Written assessment of video clips viewed by students on the content studied.
Hands-on Lab Activities including student partnerships or working independently on a given subject matter.
Independent writing assignments on a given subject.

Resources: Textbook sources
Internet resources
Lab material resoures
Teacher collaboration in the ICS setting

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): **LS4-3**	
4.0	**Students will be able to:** Independently collect, organize and analyze data from a study and use statistics and probability to reach a valid conclusion about the advantages or disadvantages of a heritable trait.
3.0	**Students will be able to:** Use concepts of statistics and probability (percentages, proportions, averages, trends in graphical data) to determine whether the number of organisms with an advantageous trait tend to increase in a population while the number of organisms without the trait tend to decrease.
2.0	**Students will be able to:** Describe trends that show the number of organisms with an advantageous trait tend to increase in a population, while the number of organisms without the advantageous trait tend to decrease.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can recognize and describe traits as either an advantage or a disadvantage in a population under certain conditions.
0.0	**Even with help, no success** I cannot yet recognize and describe traits as either an advantage or a disadvantage in a population under certain conditions.

Standard(s): LS4-4	
4.0	**Students will be able to:** Give a hypothetical scenario, I can predict how natural selection will result in an adaptation in a population.
3.0	**Students will be able to:** Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
2.0	**Students will be able to:** Explain the role of inherited variations, environmental pressure, and overproduction in causing helpful traits to become more numerous and unhelpful traits to become less numerous in a population.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can describe and give examples of inherited variations within a species and the causes of these variations (mutation, recombination through sexual reproduction). I can give examples of biotic and abiotic differences in ecosystems.
0.0	**Even with help, no success** I cannot yet explain what natural selection is or how it leads to adaptations of populations.

Unit Modifications for Special Population Students	
Advanced Learners	N/A
Struggling Learners	Extended time and review assessments Implement IEP and 504 modifications
English Language Learners	Utilize ESL learning assistance Extended time and review assessments
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504 Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.	

Interdisciplinary Connections
Indicators: **ELA/Literacy –** **RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS4-1),(HS-LS4-2),(HS-LS4-3),(HS-LS4-4)** **RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or**

technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-LS4-5)
WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS4-1),(HS-LS4-2),(HS-LS4-3),(HS-LS4-4)
WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-LS4-6)
WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS4-6)
WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS4-1),(HS-LS4-2),(HS-LS4-3),(HS-LS4-4),(HS-LS4-5)
SL.11-12.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. (HS-LS4-1),(HS-LS4-2)
Mathematics –
MP.2 Reason abstractly and quantitatively. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-6),(HS-LS2-7)
MP.4 Model with mathematics. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4)
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSS-ID.A.1 Represent data with plots on the real number line. (HS-LS2-6)
HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. HSS-IC.B.6 Evaluate reports based on data. (HS-LS2-6) n. (HS-LS2-6)

Integration of 21st Century Skills

Indicators:

Appropriate and contemporary technologies will be applied throughout the unit to practice 21st century skills.

Unit Seven: Evolution

Unit Description:

Students construct explanations for the processes of natural selection and evolution and then communicate How multiple lines of evidence support these explanations. Students evaluate evidence of the conditions that may result in new species and understand the role of genetic variation in natural selection. Additionally, students can apply concepts of probability to explain trends in population as those trends relate to advantageous heritable traits in a specific environment. Students demonstrate an understanding of these concepts by obtaining, evaluating, and communicating information and constructing explanations and designing solutions. The crosscutting concepts of patterns and cause and effect support the development of a deeper understanding.

Unit Duration: Unit 7 6 weeks

DesiredResults

Standard(s): HS-LS4-1 HS-LS4-2

Indicators:

HS-LS4C

HS-LS4D

Understandings:

HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-2. Construct an explanation based on evidence that the process of 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.

EssentialQuestions:

What evidence shows that different species are related?

Explain why evolution is expressed as a theory and not a law.

Describe the several scientists who were responsible For the discovery of evidence that established the theory of evolution.

List four pieces of evidences that support evolution.

Students understand the difference between evolution and creation.

Students identify the evolutionary changes that have occurred in several species including the whale, horse, and humans.

Students construct an explanation of why many organisms have evolved over time.

Students understand the link between changes in DNA, the environment and physical and behavioral changes in a species over time.

Students explain what it means to be human and predict how we may evolve in the future.

Assessment Evidence

PerformanceTasks:	**OtherEvidence:**
Written Chapter Tests Projects such as student Webquests Students Independent Work Written Quizzes on content vocabulary Written Quizzes on Lab Activities Lab Activitity participation and accuracy of the results of completion of the task.	Projects for students either Specific Research working collectively with others or independently Lab activities that demonstrate natural selection of some organisms. Written assessments by students to illustrate that change in an orgaism's DNA can influence evolution. Relate evolution to adaptations and natural selection. Utilize models of human craniums to see changes in shape and size of our ancestors. Written assessments either formally or informally of student knowledge of the content. Lab activities on evolution and adaptation. Examination and written evaluation of fossil evidence from several bones and imprints to human skull changes over a 3 million year period. Textbook essential supplemental activities, main conceptual points, formal assessments, and textbook generated animation content. Written assessments either formally or informally of student knowledge of the content. Appropriate models and demonstrations. Proper use of equipment: scales, balances, microscopes, and other instrumentation when needed. Laptops as applicable. Webquest research of content topics.

Benchmarks:

Successfully completing written tests and quizzes. Completion of lab activities.

LearningPlan

LearningActivities:

Student oriented independent work including classroom activies and work outside of the classroom.
Students will participate in daily warm up review questions.
Students will review key terms and all vocabulary on the subject matter.
Students will be prepared for announced and unannounced vocabulary quizzsess.
Recording notes and discussing classroom power point presentation information.
Written assessment of video clips viewed by students on the content studied.
Hands-on Lab Activities including student partnerships or working independently on a given subject matter.
Independent writing assignments on a given subject

Resources: Textbook sources
Internet resources
Lab material resoures
Teacher collaboration in the ICS setting

Unit Learning Goal and Scale *(Level 2.0 reflects a minimal level of proficiency)*	
Standard(s): **HS-LS4-1**	
4.0	**Students will be able to:** Explain whether or not new evidence supports the theory of biological evolution, and communicate ideas.
3.0	**Students will be able to:** Communicate how the fossil record, vestigial structures, homologous structures, genetic evidence, and embryological development support the theory of biological evolution.
2.0	**Students will be able to:** Describe the following: fossil record, vestigial structures, homologous structures, genetic evidence, and embryological development.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can describe some(but not all) of the following: fossil record, vestigial structures, homologous structures, genetic evidence, or embryological development.
0.0	**Even with help, no success** I cannot yet describe: fossil record, vestigial structures, homologous structures, genetic evidence,embryological development.

Standard(s): HS-LS4-2	
4.0	**Students will be able to:** Review a specific case of evolution by natural selection in a population, I can cite scientific evidence of each of the four necessary factors in the process.
3.0	**Students will be able to:** Construct an explanation of the process of evolution by natural selection, using the following four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
2.0	**Students will be able to:** Identify the four factors which results in the process of evolution and can begin to explain them using examples.
1.0	**With help, partial success at level 2.0 content and level 3.0 content:** I can identify some of the factors which result in the process of evolution by natural selection.
0.0	**Even with help, no success** I cannot yet identify the four factors which result in the process of evolution by natural selection.

Unit Modifications for Special Population Students	
Advanced Learners	N/A
Struggling Learners	Extended time and review assessments Implement IEP and 504 modifications
English Language Learners	Utilize ESL learning assistance Extended time and review assessments
Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the Parent and Educator Resource Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections
Indicators: **ELA/Literacy –** **RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS4-1),(HS-LS4-2),(HS-LS4-3),(HS-LS4-4)** **RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-LS4-5)** **WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS4-1),(HS-LS4-2),(HS-LS4-3),(HS-LS4-4)** **WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-LS4-6)** **WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden**

the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS4-6)
WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS4-1),(HS-LS4-2),(HS-LS4-3),(HS-LS4-4),(HS-LS4-5)
SL.11-12.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. (HS-LS4-1),(HS-LS4-2)
Mathematics –
MP.2 Reason abstractly and quantitatively. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-6),(HS-LS2-7)
MP.4 Model with mathematics. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4)
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
HSS-ID.A.1 Represent data with plots on the real number line. (HS-LS2-6)
HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. HSS-IC.B.6 Evaluate reports based on data. (HS-LS2-6) n. (HS-LS2-6)

Integration of 21st Century Skills

Indicators:

Appropriate and contemporary technologies will be applied throughout the unit to practice 21st century skills.