Bloomfield Public Schools
Bloomfield, New Jersey 07003

Curriculum Guide

Biology for
V.E.S.T Program
Grade 10

Prepared by:
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Board Approved: August 27, 2013

Biology
(Grade 10)

Introduction: Students in the State of New Jersey and enrolled in Bloomfield High School must successfully complete three year-long science courses in order to meet the state mandated requirements for graduation. *Biology is* available to 10th grade students who have successfully completed Environmental Science and Algebra I.

The *Biology curriculum* is designed to help all students develop good questioning skills to become critical and scientific thinkers and questioners of facts and information, rather than mere consumers of knowledge, in a safe and caring environment using Biology concepts and, at times, going beyond the New Jersey Core Content Standards for Biology. This curriculum is aligned with both the 2009 *New Jersey Core Curriculum Content Standards* and new *Common Core State Standards for English Language Arts & Literacy in Science*. The document specifically cross-references the four 21st Century themes and primary inter-disciplinary connections.

This document is a tool that will provide an overview as to what to teach, when to teach it, and how to assess student progress. As well, with considerations made for altered pacing, modifications, and accommodations; this document is to be utilized for all students enrolled in this course, regardless of ability level, native language, or classification. It is meant to be a dynamic tool that we, as educators, will revise and modify as it is used during the course of the school year.

Mapping/Sequence: The curriculum is written following the parameters of *Understanding by Design*. The document is written as a series of units containing established transfer goals, enduring understandings, essential questions, and the necessary skills and knowledge a student must attain in a school year. Each unit also stipulates both required and suggested activities and assessments. Teachers are expected to design lessons that will meet the requirements within this curriculum; however, there is flexibility is how they choose to meet these demands.

Pacing: The *Biology* curriculum is divided into five units. Each unit provides a time frame that ranges 25 to 80 days in length.

Resources: Electronic and text resources are listed in each unit. Teachers will be able to access the curriculum document on the district website.

Textbook: Biology – Cycles of Life

Established Goals: New Jersey Core Curriculum Content Standards
http://www.state.nj.us/education/cccs/2009/
http://www.corestandards.org/the-standards/english-language-arts-standards/science-technical/grades-9-10/

Overarching Understandings:
1. The existence of life on Earth depends on interactions among organisms and between organisms and their environment.

2. DNA is the universal code for life; it enables an organism to transmit hereditary information and, along with the environment, determines an organism's characteristics.

3. The diversity of life is the result of ongoing evolutionary change. Species alive today have evolved from ancient common ancestors.

Title of Unit	SCIENTIFIC PROCESS AND INTRODUCTION TO BIOLOGY	Grade Level	10th
Curriculum Area	BIOLOGY	Time Frame	25 days
Developed By	Mary Jo Roszkowski		

Desired Results (Stage 1)

Established Goals

5.1 Science Practices:

A. *Understand Scientific Explanations*

5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
5.1.12.A.3: Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

5.1.B. *Generate Scientific Evidence Through Active Investigations*

5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

5.1.C. *Reflect on Scientific Knowledge*

5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.
5.1.12.C.2: Use data representations and new models to revise predictions and explanations.
5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments.

5.1.D. *Participate Productively in Science*

5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
5.1.12.D.3: Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Primary Interdisciplinary Connections

RST.9-10.1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

RST.9-10.3. Follow precisely a complex multi step procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

8.1.8.D.1 Model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics.

8.1.8.D.3 Demonstrate how information on a controversial issue may be biased.

9.1.12.A.1: Apply critical thinking and problem-solving strategies during structured learning experiences.

9.1.12.A.2: Participate in online strategy and planning sessions for course-based, school-based, or outside projects.

9.1.12.B.1: Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.

9.1.12.C.4: Demonstrate leadership and collaborative skills when participating in online learning communities and structured learning experiences.

9.1.12.C.5: Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

9.1.12.F.2: Demonstrate a positive work ethic in various settings, including the classroom and during structured learning experiences.

21st Century Interdisciplinary Themes:

__X__ Global Awareness	**_____ Financial, economic, business, and entrepreneurial literacy**
_____ Civic Literacy	**__X__ Health Literacy**

Transfer

Students will be able to independently use their learning to…

T1: Read, comprehend and evaluate an experiment.
T2: Understand and apply the parts of the scientific method.
T3: Determine if an object is living.
T4: Categorize living organisms.

Meaning

Understandings	Essential Questions
Students will understand that…	**Students will keep considering…**
U1: Students will understand science is a process **U2:** Students will understand how to formulate a meaningful question. **U3:** Students will understand that scientific knowledge is based on evidence gathered through active investigations **U4**: Students will understand how organisms are classified	**Q1:** What constitutes the natural world? **Q2:** What constitutes evidence? **Q3:** What makes a good question that can be explored scientifically?

Acquisition

Knowledge	Skills
Students will know…	Students will be able to…
K1: Selected scientific vocabulary **K2:** Use scientific facts, measurements observations to build scientific arguments **K3:** What a controlled experiment is	**S1:** Describe the characteristics of a living thing by observation **S2:** Formulate meaningful questions **S3:** Use scientific vocabulary **S4:** List four life processes

<table>
<tr><th colspan="3">Evidence (Stage 2)</th></tr>
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Performance is judged in terms of…</th><th><u>Assessment Evidence</u></th></tr>
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K1-K3
U1-U4</td><td rowspan="2">Comprehension

Application

Evaluation</td><td><u>Transfer Task(s)</u>
<u>Formative:</u>
• Questioning
• Self assessment
• Organization of facts</td></tr>
<tr><td><u>Summative:</u>
• Tests
• Quizzes
• Projects</td></tr>
<tr><td rowspan="2">T1-T4
S1-S4</td><td rowspan="2">Responses

Application

Descriptions

Comparisons</td><td><u>Other Evidence</u>
<u>Formative:</u>
• Observation
• worksheets
• Homework</td></tr>
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• labs</td></tr>
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Learning Plan (Stage 3)

Checks for alignment and best practice	Summary of Key Learning Events and Instruction *The teaching and learning needed to achieve the unit goals.*	
T1-T4 **K1-K3** **U1-U4** **T1-T4** **S1-S4**	**Required Activities**	**Required Resources**
	Reading for Meaning	*Biology – Cycles of Life (AGS Publishing 2006* *Chapter 1("Investigating the Cycles of Life"), pg 2-29*
	Classifying specimens as living, dead, abiotic	Live specimens including but not limited to bugs, worms, goldfish Preserved specimens including but not limited to frogs, worms, various insects, and protists on prepared slides.
	Learning scientific vocabulary	Vocabulary list attached
	Suggested Activities	**Suggested Resources**
	Characteristics of Life Lab	PBS Students and Teachers Resources http://www.pbs.org/teachers
	Using the Scientific Method Investigation	Text pg 23-24
	Investigation 1 What is Life?	Text p.15-16
	M and M's Experiment	
	Lesson Reviews throughout Chapter 1	Text pg. 4, 9, 14, 22
	Designing a Controlled Experiment	

Strategies for Differentiation

Students Below Target:	Students Meeting or Exceeding Target:
Paired/Group Activity	Cooperative learning
Guided practice	Independent study
Cooperative learning	Learning Buddies
One-on-one instruction from paraprofessional	Teach organizational skills
Learning Buddies	Test modifications that are challenging
Small group instruction	
Modified notes, worksheets and tests	
Provided study guides	
Chunking and grouping of material	
Teach organizational skills	
Time extensions on tests	.

Additional Strategies	
Choose broad instructional concepts and skills that lend themselves to understanding at various levels of complexity.	Teacher adjusts content, process, product according to students' readiness interest, and learning profile
Provide access to a variety of materials which target different learning preferences and reading abilities.	Use a variety of assessment strategies, including performance-based and open-ended assessment.
Develop activities that target auditory, visual, and kinesthetic learners.	Encourage thinking at various levels of Bloom's taxonomy.
Have a variety of materials, resources, and texts available for student use. Students exploring a concept should have access to written descriptions, graphic images, and audio-visual representations related to the topic. A student with above or below grade-level reading ability will benefit from studying textbooks and reading materials at the appropriate level. Supporting materials for investigation and experimentation should be readily available, and students should be trained in their use.	Engage students in orbital studies: Develop a list of topics related to a science concept or theme. Allow each student to select a topic based on interest. Have each student conduct an independent investigation of the chosen topic with guidance and coaching from the teacher. This type of activity allows flexibility in pacing, degree of complexity, and the nature of the product produced by student
Establish stations for inquiry-based, independent learning activities.	Balance teacher-assigned and student-selected projects.
Create activities that vary in level of complexity and degree of abstract thinking required.	Offer students a choice of projects that reflect a variety of learning styles and Utilize pre-tests to assess where individual students need to begin study of a given topic or unit.
Use flexible grouping to group and regroup students based on factors including content, ability, and assessment results.	Use a variety of instructional delivery methods to address different learning styles.
Utilize pre-tests to assess where individual students need to begin study of a given topic or unit	Break assignments into smaller, more manageable parts that include structured directions for each part.
Break assignments into smaller, more manageable parts that include structured directions for each part	Use a variety of instructional delivery methods to address different learning styles
Vary degree of complexity of laboratory investigations	Utilize complex instruction - design open ended task related to topic
	Encourage thinking at various levels of Bloom's taxonomy.
	Varying the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

Title of Unit	Energy Cycles/ Photosynthesis	Grade Level	10th
Curriculum Area	BIOLOGY	Time Frame	30 days
Developed By			

Desired Results (Stage 1)

Established Goals

5.3 Life Science

B. *Matter and Energy Transformations*

5.3.12.B.1: Cite evidence that the transfer and transformation of matter and energy links organisms to one another and to their physical setting.

5.3.12.B.2: Use mathematical formulas to justify the concept of an efficient diet.

5.3.12.B.3: Predict what would happen to an ecosystem if an energy source was removed.

5.3.12.B.4: Explain how environmental factors (such as temperature, light intensity, and the amount of water available) can affect photosynthesis as an energy storing process.

5.3.12.B.5: Investigate and describe the complementary relationship (cycling of matter and flow of energy) between photosynthesis and cellular respiration.

Primary Interdisciplinary Connections

RST.9-10.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.

RST.9-10.5. Analyze the structure of the relationships among concepts in a text, including relationships among key terms

RST.9-10.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address

8.1.8.D.1: Model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics.

8.1.8.D.3: Demonstrate how information on a controversial issue may be biased.

9.1.12.A.1: Apply critical thinking and problem-solving strategies during structured learning experiences.

9.1.12.A.2: Participate in online strategy and planning sessions for course-based, school-based, or outside projects.

9.1.12.B.1: Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving

problems, using multiple perspectives.

9.1.12.C.4: Demonstrate leadership and collaborative skills when participating in online learning communities and structured learning experiences.

9.1.12.C.5: Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

9.1.12.F.2: Demonstrate a positive work ethic in various settings, including the classroom and during structured learning experiences.

21st Century Interdisciplinary Themes:

__X__ Global Awareness	**__X__ Financial, economic, business, and entrepreneurial literacy**
__X__ Civic Literacy	**__X__ Health Literacy**

Transfer

Students will be able to independently use their learning to…

T1: Explain how plants change the earth's atmosphere by removing carbon dioxide
T2: Describe how chlorophyll captures light energy
T3: Understand the fundamental differences between plants and animals

Meaning

Understandings	Essential Questions
Students will understand that…	**Students will keep considering…**
U1: Students will understand that energy is constantly being harvested, used, and transformed. **U2:** Students will understand that energy and matter have a critical relationship to life.	**Q1:** How are matter and energy related to life and transformed in living systems? **Q2:** How are different organisms interconnected? **Q3:** Why is photosynthesis critical for life on Earth?

Acquisition	
Knowledge Students will know…	**Skills** Students will be able to…
K1: Selected scientific vocabulary **K2:** The relationship between photosynthesis and all living things **K3:** How plants transfer solar energy into chemical energy	**S1:** formulating meaningful questions **S2:** use scientific vocabulary **S3:** explain steps of the transfer process

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T1-T3
T1-T2</td><td rowspan="2">Comprehension

Application

Evaluation</td><td><u>Transfer Task(s)</u>
<u>Formative:</u>
• Questioning
• Self assessment
• Graphic organizers</td></tr>
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• Projects/Classwork</td></tr>
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Application

Descriptions

Comparisons</td><td><u>Other Evidence</u>
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Learning Plan (Stage 3)

Checks for alignment and best practice	Summary of Key Learning Events and Instruction *The teaching and learning needed to achieve the unit goals.*	
T1-T3 **T1-T3** **T1-T2** **Q1-Q3** **S1-S3**	**Required Activities**	**Required Resources**
	Reading for Meaning	Text Biology – Cycles of Life (AGS Publishing 2006) Chapter 8 (Photosynthesis in the Energy Cycle) pg.223-246
	Writing balanced equations	
	Listing all the steps involved in Photosynthesis	
	Describing the reactants and products of photosynthesis	
	Suggested Activities	**Suggested Resources**
	Role play the process of photosynthesis	
	Experiment with Sweet Potatoes and carrots	Milliken Worksheets 9, 10, 11
	Experiment on plant growth without light	

Strategies for Differentiation	
Students Below Target:	**Students Meeting or Exceeding Target:**
Paired/Group Activity	Role Play
Guided practice	Cooperative Learning
Role Play	Independent study
Cooperative Learning	Teach organizational skills
Learning Buddies	Test modifications
Small group instruction	Time extensions
One-on-one instruction from paraprofessional	
Chunking and grouping of material	
Provide study guides	
Teach organizational skills	
Test modifications/ time extensions	

Additional Strategies	
Choose broad instructional concepts and skills that lend themselves to understanding at various levels of complexity.	Teacher adjusts content, process, product according to students' readiness interest, and learning profile
Provide access to a variety of materials which target different learning preferences and reading abilities.	Use a variety of assessment strategies, including performance-based and open-ended assessment.
Develop activities that target auditory, visual, and kinesthetic learners.	Encourage thinking at various levels of Bloom's taxonomy.
Have a variety of materials, resources, and texts available for student use. Students exploring a concept should have access to written descriptions, graphic images, and audio-visual representations related to the topic. A student with above or below grade-level reading ability will benefit from studying textbooks and reading materials at the appropriate level. Supporting materials for investigation and experimentation should be readily available, and students should be trained in their use.	Engage students in orbital studies: Develop a list of topics related to a science concept or theme. Allow each student to select a topic based on interest. Have each student conduct an independent investigation of the chosen topic with guidance and coaching from the teacher. This type of activity allows flexibility in pacing, degree of complexity, and the nature of the product produced by student
Establish stations for inquiry-based, independent learning activities.	Balance teacher-assigned and student-selected projects.
Create activities that vary in level of complexity and degree of abstract thinking required.	Offer students a choice of projects that reflect a variety of learning styles and Utilize pre-tests to assess where individual students need to begin study of a given topic or unit.
Use flexible grouping to group and regroup students based on factors including content, ability, and assessment results.	Use a variety of instructional delivery methods to address different learning styles.
Tiered assignments - direct instruction , guidance based groups, work in higher level learners	Break assignments into smaller, more manageable parts that include structured directions for each part.
Utilize pre-tests to assess where individual students need to begin study of a given topic or unit.	Use a variety of instructional delivery methods to address different learning styles
Break assignments into smaller, more manageable parts that include structured directions for each part.	utilize complex instruction - design open ended task related to topic
Vary degree of complexity of lab investigations	
	Varying the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

Title of Unit	Evolution and Ecosystems	Grade Level	10th
Curriculum Area	BIOLOGY	Time Frame	80 days
Developed By	Bloomfield High School Science Department		

Desired Results (Stage 1)

Established Goals

5.1 Science Practices:

5.1.A. *Understand Scientific Explanations*

5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

5.1.12.A.3: Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

5.1.B. *Generate Scientific Evidence Through Active Investigations*

5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.

5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

5.1.C. *Reflect on Scientific Knowledge*

5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.

5.1.12.C.2: Use data representations and new models to revise predictions and explanations.

5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments.

5.1.D. *Participate Productively in Science*

5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

5.1.12.D.3: Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

5.3 Matter and Energy Transformations

5.3.12.B.1: Cite evidence that the transfer and transformation of matter and energy links organisms to one another and to their physical setting.

5.3.12.B.3: Predict what would happen to an ecosystem if an energy source was removed

5.3.12.B.4: Explain how environmental factors (such as temperature, light intensity, and the amount of water available) **can** affect photosynthesis as an energy storing process.

5.3 Interdependence

5.3.12.C.1: Analyze the interrelationship and interdependence among different organisms, and explain how these relationships contribute to the stability of the ecosystem.

5.3.12.C.2: Model how natural and human-made changes in the environment will affect individual organisms and the dynamics **of populations.**

5.3 Evolution and diversity

5.3.12.E.1: Account for the appearance of a novel trait that arose in a given population

5.3 12.E.2: Estimate how closely related species are, based on scientific evidence (eg., anatomical similarities, similarities of DNA base and/or amino acid sequence).

5.3.12.E.3: Provide a scientific explanation for the history of life on earth using scientific evidence (eg., fossil record, DNA, protein structures, etc).

5.3.12.E.4: Account for the evolution of a species by citing specific evidence of biological mechanisms.

Primary Interdisciplinary Connections

RST.9-10.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2: Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

RST.9-10.3: Follow precisely a complex multi step procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

8.1.12.D.1: Evaluate policies on unauthorized electronic access (e.g., hacking) and disclosure and on dissemination of personal information.

8.2.12.F.1: Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.

9.1.12.A.1: Apply critical thinking and problem-solving strategies during structured learning experiences.

9.1.12.A.2: Participate in online strategy and planning sessions for course-based, school-based, or outside projects.

9.1.12.B.1: Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving

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9.1.12.F.2: Demonstrate a positive work ethic in various settings, including the classroom and during structured learning experiences.

21st Century Interdisciplinary Themes:

__X__ Global Awareness **_____ Financial, economic, business, and entrepreneurial literacy**
_____ Civic Literacy **__X__ Health Literacy**

Transfer

Students will be able to independently use their learning to…

T1: Explain how evolution through natural selection explains the Earth's diversity
T2: Describe how energy flows through ecosystems
T3: Cite how natural and human-made changes affect ecosystems

Meaning

Understandings	Essential Questions
Students will understand that…	**Students will keep considering…**
U1: Evolution is responsible for the diversity of life on earth. **U2:** Ecosystems provide resources for all life on earth. **U3:** Energy flows through ecosystems through the trophic structure. **U4:** Natural changes and humans can positively and/or negatively affect ecosystems	**Q1 How can evolution explain the diversity of living organisms?** **Q2:** How does energy flow through ecosystems **Q3:** How do natural changes and humans affect ecosystems

Acquisition	
Knowledge Students will know…	**Skills** Students will be able to…
K1: selected scientific vocabulary **K2:** Evidence for evolution **K3: the process of natural selection** **K4: Food pyramids** **K5: the affects of natural and human- made changes on ecosystems and living organisms**	**S1:** formulate meaningful questions **S2:** use scientific vocabulary **S3:** explain how energy flows through ecosystems **S4:** describe how natural changes and humans can affect ecosystems

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Learning Plan (Stage 3)

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T1-T3 **K1-K4** **U1-U4** **Q1-Q3** **S1-S4**	**Required Activities**	**Required Resources**
	Reading for Meaning	*Text Biology – Cycles of Life (AGS PUBLISHING, 2006) Chapters 13 "Evolution and Natrural Selection" pg 387-425 and 18 "Ecosystems" pg 565-589 and 19 "Human Impact" and Technology pg.591-619*
	Diagramming a food chain or food web	
	Using a microscope and dissection tools	
	learning scientific vocabulary Listing the positive and negative effects of human impact Worksheets on ecosystems	Vocabulary lists are attached Habitats (On the Mark Press)
	Suggested Activities	**Suggested Resources**
	Owl Pellet Dissection	
	Evolution Lab- fossil specimens, articles and questions	PBS Students and Teacher Resources http://www.pbs.org/teachers
	Worksheets on Human Impact	
	Reports on rainforest animals	
	Save Ecosystem Posters	

Strategies for Differentiation	
Students Below Target:	**Students Meeting or Exceeding Target:**
Paired/Group Activity	Cooperative learning
Guided practice	Learning buddies
Cooperative Learning	Independent study
Learning Buddies	Teach organizational skills
Small Group Instruction	Test Modifications
Chunking or grouping or material	Time Extensions
One on one instruction with paraprofessional	
Teach organizational skills	
Test Modifications/time extensions	

Additional Strategies	
Choose broad instructional concepts and skills that lend themselves to understanding at various levels of complexity.	Teacher adjusts content, process, product according to students' readiness interest, and learning profile
Provide access to a variety of materials which target different learning preferences and reading abilities.	Use a variety of assessment strategies, including performance-based and open-ended assessment.
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Create activities that vary in level of complexity and degree of abstract thinking required.	Offer students a choice of projects that reflect a variety of learning styles and Utilize pre-tests to assess where individual students need to begin study of a given topic or unit.
Use flexible grouping to group and regroup students based on factors including content, ability, and assessment results.	Use a variety of instructional delivery methods to address different learning styles.
Tiered assignments - direct instruction , guidance based groups, work in higher level learners	Break assignments into smaller, more manageable parts that include structured directions for each part.
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Vary degree of complexity of material presented	Encourage thinking at various levels of Bloom's taxonomy.
	Varying the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

Title of Unit	Organization and Development	Grade Level	10th
Curriculum Area	BIOLOGY	Time Frame	20 days
Developed By	Mary Jo Roszkowski		

Desired Results (Stage 1)

Established Goals

5.1 Science Practices

5.1.A: *Understand Scientific Explanations*

5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.

5.1.12.A.3: Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

5.1.B. Generate Scientific Evidence Through Active Investigations

5.1.12.B.1: Design investigations, collect evidence, analyze data and evaluate evidence to determine measures od central tendencies, casual/correlational relationships, and anomalous data.

5.1.12.B.2; Build refine, and represent evidence-based models using mathematical, physical, and computational tools.

5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/ arguments to established scientific knowledge, models and theories.

5.1.12.B.4; Develop quality controls to examine data sets and to examine as a means of generating and reviewing explanations.

5.1.C. Reflect on Scientific Knowledge

5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.

5.1.12.C.2: Use data representations and new models to revise predictions and explanations

5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments.

5.1.D .Participate productively in Science

5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations and experiences.

5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

5.1.12.D.3: Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

5.3.A. Organization and Development
5.3.12.A.1 represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models
5.3.12.A.3: Predict a cell's response in a given set of environmental conditions.
5.3.12.A.4 Cells divide through the process of mitosis, resulting in daughter cells that have the same genetic composition as the original cell.
5.3.D: Heredity and Reproduction
5.3.12.D.2: Predict the potential impact on an organism (no impact, significant impact) given a change in a specific DNA code, provide specific real world examples caused by mutations.

SCI.9-12.5.3.12.A: Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions.

Primary Interdisciplinary Connections

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

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.

RST.9-10.9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts

8.1.12.D.1--Evaluate policies on unauthorized electronic access (e.g., hacking) and disclosure and on dissemination of personal information.

8.2.12.F.1 Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system

9.1.12.A.1: Apply critical thinking and problem-solving strategies during structured learning experiences.

9.1.12.A.2: Participate in online strategy and planning sessions for course-based, school-based, or outside projects.

9.1.12.B.1: Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving

problems, using multiple perspectives.

9.1.12.C.4: Demonstrate leadership and collaborative skills when participating in online learning communities and structured learning experiences.

9.1.12.C.5: Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

9.1.12.F.2: Demonstrate a positive work ethic in various settings, including the classroom and during structured learning experiences.

21st Century Interdisciplinary Themes:

__X__ Global Awareness **_____ Financial, economic, business, and entrepreneurial literacy**
_____ Civic Literacy **__X__ Health Literacy**

Transfer

Students will be able to independently use their learning to…

T1: Diagram cells and identify the function of different parts of a cell.
T2: Differentiate between plant and animal cells**.**
T3: Describe/Explain how genetic information is passed through generations.

Meaning

Understandings	Essential Questions
Students will understand that…	**Students will keep considering…**
U1: All organisms are made of cells that carry out functions required for life **U2:** Cells are made of molecules and there are different types of cells. **U3:** Structure determines function in cells. **U4:** Chromosome and DNA/RNA play a complex role in reproduction.	**Q1:** What makes up living things and how do we exist? **Q2:** How does form relate to function? **Q3:** What controls who we are?

Acquisition	
Knowledge Students will know…	**Skills** Students will be able to…
K1: selected scientific vocabulary **K2:** traits are passed from parents to offspring **K3:** how to relate the structures of organelles to their function K4: how a cell reproduces	**S1:** formulate meaningful questions **S2:** predict the probability of offspring from a variety of crosses **S3:** **S4:** Predict how a DNA mutation will affect the protein and the entire organism

<table>
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K1-K3
U1-U4</td><td rowspan="2">Comprehension

Application

Evaluation</td><td><u>Transfer Task(s)</u>
<u>Formative:</u>
• Questioning
• Self assessment
• Organization of facts</td></tr>
<tr><td><u>Summative:</u>
• Tests
• Quizzes
• Projects</td></tr>
<tr><td rowspan="2">Q1-Q3
S1-S4</td><td rowspan="2">Responses

Application

Descriptions

Comparisons</td><td><u>Other Evidence</u>
<u>Formative:</u>
• Observation
• worksheet
• Homework</td></tr>
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</table>

Learning Plan (Stage 3)

Checks for alignment and best practice	Summary of Key Learning Events and Instruction *The teaching and learning needed to achieve the unit goals.*	
T1-T3 **K1-K3** **U1-U4** **Q1-Q3** **S1-S4**	**Required Activities**	**Required Resources**
	Reading for Meaning	*Biology – Cycles of Life (AGS Publishing 2006) Chapter 4 pg.102-130 Chapter 9 246-256 Chapter 10 and 11 Pg 276-340.*
	Use microscope to observe plant and animal cells Answer questions on accompanying slide cards	Microslide viewers – Biology Dept.
	Learn scientific vocabulary	Vocabulary list attached
	Construct models of animal cell and plant cell	
	Suggested Activities	**Suggested Resources**
	Research a genetic disorder and present to class	Internet resources, i.e., Medline, Mayo Clinic, etc.
	Mating lab	Biology Lab Manual
	Construct model of DNA	
	Use Punnett squares to predict genotype and phenotype probabilities	

Strategies for Differentiation	
Students Below Target:	**Students Meeting or Exceeding Target:**
Paired/Group Activity	Role Play
Guided practice	Cooperative learning
Role Play	Independent Study
QAR	Interest based mini lessons
Cooperative Learning	Learning Buddies
Learning Buddies	Teach organizational skills
One on One instruction with paraprofessional	Test Modifications
Small group instruction	Time extensions
Modified worksheets	
Chunking or grouping of material	
Provided study guides	
Teach organizational skills	
Test modifications/time extensions	

Additional Strategies	
Choose broad instructional concepts and skills that lend themselves to understanding at various levels of complexity.	Teacher adjusts content, process, product according to students' readiness interest, and learning profile
Provide access to a variety of materials which target different learning preferences and reading abilities.	Use a variety of assessment strategies, including performance-based and open-ended assessment.
Develop activities that target auditory, visual, and kinesthetic learners.	Encourage thinking at various levels of Bloom's taxonomy.
Have a variety of materials, resources, and texts available for student use. Students exploring a concept should have access to written descriptions, graphic images, and audio-visual representations related to the topic. A student with above or below grade-level reading ability will benefit from studying textbooks and reading materials at the appropriate level. Supporting materials for investigation and experimentation should be readily available, and students should be trained in their use.	Engage students in orbital studies: Develop a list of topics related to a science concept or theme. Allow each student to select a topic based on interest. Have each student conduct an independent investigation of the chosen topic with guidance and coaching from the teacher. This type of activity allows flexibility in pacing, degree of complexity, and the nature of the product produced by student
Establish stations for inquiry-based, independent learning activities.	Balance teacher-assigned and student-selected projects.
Create activities that vary in level of complexity and degree of abstract thinking required.	Offer students a choice of projects that reflect a variety of learning styles and Utilize pre-tests to assess where individual students need to begin study of a given topic or unit.
Use flexible grouping to group and regroup students based on factors including content, ability, and assessment results.	Use a variety of instructional delivery methods to address different learning styles.
Tiered assignments - direct instruction , guidance based groups, work in higher level learners	Break assignments into smaller, more manageable parts that include structured directions for each part.
Utilize pre-tests to assess where individual students need to begin study of a given topic or unit.	Use a variety of instructional delivery methods to address different learning styles
Break assignments into smaller, more manageable parts that include structured directions for each part.	utilize complex instruction - design open ended task related to topic
Vary degree of complexity of laboratory investigations	Encourage thinking at various levels of Bloom's taxonomy.
	Varying the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

Title of Unit	Human Body Systems	Grade Level	10th
Curriculum Area	BIOLOGY	Time Frame	35 days
Developed By	Mary Jo Roszkowski		

Desired Results (Stage 1)

Established Goals

5.1 Science Practices:

5.1.A. *Understand Scientific Explanations*

5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.

5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and pose theories .

5.1.12.A3: Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

5.1.B Generate Scientific Evidence Through Active Investigations

5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships, and anomalous data.

5.1.12.B.2; Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models and theories.

5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

5.1.C. Reflect on Scientific Knowledge

5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.

5.1.12.C.2; Use data representations and new models to revise predictions and explanations

5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments.

5.1.D Participate Productively in Science

5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations and experiences.

5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

5.1.12.D.3: Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

5.3.A Organization and Development

5.3.12.A.1: Represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models.

5.3.12.A.3: Predict a cell's response in a given set of environmental conditions.

5.3.12.A.6: Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).

5.3.D Heredity and Reproduction

5.3.12.D.3: Demonstrate through modeling how the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring (meiosis, fertilization).

Primary Interdisciplinary Connections

RST.9-10.1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept;

8.1.12.D.1--Evaluate policies on unauthorized electronic access (e.g., hacking) and disclosure and on dissemination of personal information.

8.2.12.F.1 Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.

9.1.12.A.1: Apply critical thinking and problem-solving strategies during structured learning experiences.

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21st Century Interdisciplinary Themes:

__X__ Global Awareness **_____ Financial, economic, business, and entrepreneurial literacy**

_____ Civic Literacy **__X__ Health Literacy**

Transfer

Students will be able to independently use their learning to…

T1: describe the function of each of the human body systems
T2: explain how all human body systems interact and how their activities are coordinated
T3: explain the process of human reproduction

Meaning

Understandings	Essential Questions
Students will understand that…	**Students will keep considering…**
U1: Students will understand that the human body is controlled by different systems. **U2**: The systems work together to allow the human body to live. **U3**: A balanced, healthy diet and exercise is needed for energy and good health. **U4:** humans reproduce through sexual reproduction	**Q1:** How does the human body work? **Q2:** What is the relationship between different body systems? **Q3**: What is needed in order to keep the human body healthy? **Q4**: How is human life created?

Acquisition

Knowledge Students will know…	Skills Students will be able to…
K1: selected scientific vocabulary **K2:** the human body systems **K3:** healthy body requirements **K4**: how humans reproduce	**S1:** formulate meaningful questions **S2:** use scientific vocabulary **S3:** understand how life is created and how the human body works

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T1-T3 **K1-K4** **U1-U4** **Q1-Q4** **S1-S3**	**Required Activities**	**Required Resources**
	Reading for Meaning	*Biology- Cycles of Life* (AGS Publishing 2006) Chapter 9 pg 247-271. Chapter 12 pg.342-383.
	Worksheets on the human body systems	The Human Body (Milliken Publishing)
	Brittle Bones experiment	Life Science (Remedia Publications)
	CO2 Experiment	Biology Dept.
	Left or right Sided Experiment	Life Science (Remedia Publishing)
	Suggested Activities	**Suggested Resources**
	Dissection of frog lab	Biology Dept.
	Dissection of sheep heart Lab	Biology Dept.
	Create a model of a lung	Life Science (Remedia Publications)

Strategies for Differentiation	
Students Below Target:	**Students Meeting or Exceeding Target:**
Paired/Group Activity	Cooperative learning
Guided practice	Independent study
Cooperative learning	Interest based mini lessons
QAR	Teach organizational skills
Learning Buddies	Test Modifications
One on one instruction from paraprofessional	Time extensions
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Biology Vocabulary

Unit 1 – Scientific Process and Introduction to Biology

Adaptation, Biology, Biologist, Cycle, Energy, Evolution, Hypothesis, Organism, Reproduction, Species

Unit 2 – Energy Cycles/ Photosynthesis

Autotroph, Carbon dioxide, Chlorophyll, Chloroplast, Oxygen, Photosynthesis, Plant, Pollination, Stoma, Vascular Bundles

Unit 3 – Evolution and Ecosystems

Chemotroph, Consumers, Decomposers, Ecologist, Ecosystem, Endangered, Environment, Extinction, Food Chain, Phototroph, Producers, Threatened

Unit 4 – Organization and Development

Cell, Cell Membrane, Chromosome, Cytoplasm, Dominant Gene, Eukaryote, Gene, Heredity, Homeostasis, Hybrid, Mitochondria, Molecules, Mutation, Nucleus, Organ, Organelle, Organ System, Prokaryote, Recessive Gene, Tissue, Traits

Unit 5 – Human Body Systems

Aorta, Artery, Asthma, Biceps, Bile, Bones, Bronchitis, Cardiac, Cartilage, Cerebellum Cerebral Palsy, Cerebrum, Circulatory System, Diaphragm, Digestive System, Epilepsy, Estrogen, Fallopian Tube, Gluteus Maximus, Hemophilia, Intercostals, Ligament, Liver, Lungs, Menstruation, Muscular, muscles, Nervous System, Osteoporosis, Ovary, Ovulation, Penis, Plasma, Reproductive System, Respiratory System, Saliva, Scrotum, Sensory System, Skeletal, Skull, Tendons, Testis, Testosterone, Thalmus, Uterus, Vagina