

FREEHOLD REGIONAL HIGH SCHOOL DISTRICT

OFFICE OF CURRICULUM AND INSTRUCTION

ANIMAL AND BOTANICAL SCIENCES

AGRIBIOLOGY

Grade Level: 9

Credits: 5

BOARD OF EDUCATION ADOPTION DATE:

AUGUST 22, 2011

[SUPPORTING RESOURCES AVAILABLE IN DISTRICT RESOURCE SHARING](#)

APPENDIX A: ACCOMMODATIONS AND MODIFICATIONS

APPENDIX B: ASSESSMENT EVIDENCE

APPENDIX C: INTERDISCIPLINARY CONNECTIONS

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Agribiology - Introduction

Introduction

Course Philosophy

Agriculture is the largest employer with more than 22 million people working in some phase of the industry. There are over 300 related careers in the science, technology and business of agriculture. Students who wish to pursue agricultural careers such as veterinary science, genetic engineering, food science, landscape architecture, natural resource management, turf management, and agribusiness need a strong biological science background. The goal of this course is to provide an understanding of real-world agricultural applications of biological concepts.

Course Description

Agribiology will explain the scientific principles behind food, fiber, and natural resource systems. The course will follow the same format as Laboratory Biology, with units covering: lab safety, cell processes, genetics, evolution, classification and ecology. Labs, readings, discussions, and projects will help guide students in their studies. FFA and SAE will also be a part of the course, enabling students to develop career skills and participate in Career Development Events such as the Agricultural Essay, 3-5 Minute Speech, Creed Speaking, Environmental and Natural Resources CDE and other state and national contests. By the end of the course, students will be prepared to take the New Jersey Biology Completer Exam. They will also be prepared to make a well informed decision about many of the career opportunities in plant, animal, food and environmental sciences.

Course Map and Proficiencies/Pacing

Course Map

Relevant Standards	Enduring Understanding	Essential Questions	Assessments		
			Diagnostic	Formative	Summative
5.1.12.B.1 5.1.12.B.3 5.1.12.C.1 5.1.12.D.1 5.1.12.D.2	Agricultural, environmental and biological issues can be solved using the scientific method.	How is the scientific method used to solve problems related to agriculture and the environment? What are the characteristics of life? What are the levels of organization used to describe life?	Pre-test Graphic organizers	Formative assessments Think/pair/share Worksheets Exit cards Remote responders BCT practice questions on-line tutorials	Unit test NJBCT
5.1.12.D.3	Safety procedures and personal protective equipment will reduce the risk of injury.	What are safe practices for the laboratory? What personal protective equipment should be used? How should accidents and injuries be handled?	Pre-test Remote responders	Formative assessments Worksheets Exit cards BCT practice questions On-line tutorials	Unit tests NJBCT
5.3.12.E.2	Classification helps us compare and name organisms.	How are organisms classified? How is binomial nomenclature used? What are the domains and kingdoms of life? How can we use dichotomous keys to classify organisms?	Pre-test Concept illustration	Formative assessments Worksheets Exit cards Remote responders BCT practice questions On-line tutorials	Unit test Dichotomous Key Practicum NJBCT

<p>5.3.12.B.1 5.3.12.B.3 5.3.12.C.1 5.3.12.C.2 5.4.12.G.4</p>	<p>Ecosystems are complex, involving interrelationships amongst living organisms.</p>	<p>How does energy flow through an ecosystem? How do the interrelationships in an ecosystem affect the stability? How do natural and human impacts affect ecosystems and biomes?</p>	<p>Pre-test KWL Chart</p>	<p>Formative assessments Lab journals/reports Worksheets Exit cards Remote responders BCT practice questions On-line tutorials</p>	<p>Unit test Biomes Project Biology completer test</p>
<p>5.2.12.A.1 5.2.12.A.6 5.3.12.A.1 5.3.12.A.2</p>	<p>All living organisms are made of similar molecules.</p>	<p>What are the basic building blocks of life? What are the macromolecules common to all living organisms? What is the pH scale? What is the role of enzymes?</p>	<p>Pre-test Graphic organizers</p>	<p>Formative assessments Lab journals/reports Worksheets Exit cards Structural Models Remote responders BCT practice questions On-line tutorials</p>	<p>Unit test NJBCT</p>
<p>5.1.12.D.3 5.3.12.A.1</p>	<p>Microscopes are an essential tool used in agribiology to study cells, their organelles and functions.</p>	<p>What are the microscope parts and function? How do cells vary in structure and function?</p>	<p>Vocabulary pre-test KWL Chart</p>	<p>Formative assessments Lab journals/reports Worksheets Exit cards BCT practice questions Remote responders On-line tutorials</p>	<p>Unit test Microscope Practicum NJBCT</p>

5.3.12.A.6	Viruses and bacteria impact agriculture in both positive and negative ways.	How do viral and bacterial diseases compare? What positive and negative effects do bacteria have on agriculture?	Pre-test Concept mapping	Formative assessments Worksheets Web quest Exit cards BCT practice questions Remote responders On-line tutorials	Unit test Lab Journals/reports NJBCT
5.3.12.A.3	Substances are constantly moving in and out of cells.	What methods are used to move substances into and out of cells?	Pre-test Concept illustration	Formative assessments Lab journals/Reports Worksheets Exit cards BCT practice questions Remote responders On-line tutorials	Unit test NJBCT
5.3.12.B.1 5.3.12.B.4 5.3.12.B.6	Matter cycles through organisms and ecosystems.	What cyclical processes affect living organisms?	Pre-test Concept illustration	Formative assessments Drawings of Cycles Exit cards Terminology inventory BCT practice questions On-line tutorials	Unit test Project NJBCT

5.3.12.A.4 (MITOSIS) 5.3.12.D.3 5.3.12.A.6 5.3.12.D.2	DNA is the basic heredity unit of all cells.	What is the structure and function of DNA and chromosomes? How do cells reproduce? How are some diseases a function of genetic mutations?	Pre-test Graphic organizer	Formative assessments Lab journals/reports DNA Models Worksheets Exit cards Remote responders BCT practice questions On-line tutorials	Unit test NJBCT
5.3.12.D.2 5.3.12.E.1	Selective breeding has produced great variation in plants and animals.	How can genetic probability be used in selective breeding of plants and animals?	Pre-test KWL Chart	Formative assessments Worksheets Exit cards BCT practice questions On-line tutorials	Unit test Performance assessment NJBCT
5.3.12.A.5 5.3.12.D.1	Genetic engineering is a controversial technology being used in agriculture.	What technologies are being used in genetic engineering of plants and animals? What are the pros and cons of genetic engineering?	Pre-test Think/pair/share	Formative assessment Worksheets Virtual labs online Exit cards Remote responders BCT practice questions On-line tutorials	Unit test Performance assessment NJBCT

<p>5.3.12.E.2 5.3.12.E.3 5.3.12.E.4 5.4.12.B.3</p>	<p>Scientific evidence is used to support the theory of evolution.</p>	<p>What evidence supports the theory of evolution?</p>	<p>Pre-test Concept illustration</p>	<p>Formative assessments Lab journals/reports Team timeline project Worksheets Exit cards BCT practice questions On-line tutorials</p>	<p>Unit test Performance assessment NJBCT</p>
<p>5.1.12.B.1 9.1.12.F.2 9.4.12.A.3 9.4.12.A.9 9.4.12.A.60</p>	<p>Real-world experimentation and observation in agribiology is needed to explore career opportunities.</p>	<p>How does experimentation and observation in agribiology develop career interest? What careers exist in agribiology?</p>	<p>Career Interest Survey SAE survey</p>	<p>SAE Blog Checkpoints Skills/activities checkpoint Photo checkpoints</p>	<p>SAE final report</p>

Proficiencies and Pacing

Unit Title	Unit Understanding(s) and Goal(s)	Recommended Duration
Unit 1: LAB SAFETY	At the conclusion of this unit, students will be able to: 1. Explain the safety rules and proper use of tools used in the agribiology classroom.	1/2 week
Unit 2: SCIENTIFIC INQUIRY AND CHARACTERISTICS OF LIFE	Agricultural, environmental and biological issues can be solved using the scientific method At the conclusion of this unit, students will be able to: 1. Compare the characteristics of living and non-living things 2. Perform the steps of the scientific method	1 1/2 weeks
Unit 3: TAXONOMY	Classification helps us compare and name organisms At the conclusion of this unit, students will be able to: 1. Identify species using scientific nomenclature 2. Use a dichotomous key to classify organisms	1 week
Unit 4: ECOLOGY	Ecosystems are complex, involving interrelationships amongst living organisms. At the conclusion of this unit, students will be able to: 1. Analyze energy flow through a food chain/web 2. Distinguish characteristics of major biomes 3. Analyze human impact on the environment	3 weeks
Unit 5: MACROMOLECULES	All living organisms are made of similar molecules At the conclusion of this unit, students will be able to: 1. Describe the basic chemical structure and function of macromolecules 2. Test the pH of soil/water/food products	3 weeks
Unit 6: CELL STRUCTURE AND ORGANIZATION	Microscopes are an essential tool used in agribiology to study cells, their organelles and functions At the conclusion of this unit, students will be able to: 1. Use a microscope to make observations 2. Compare cell structure of prokaryotes and eukaryotes	2 weeks

<p>Unit 7: VIRUSES AND BACTERIA</p>	<p>Viruses and bacteria impact agriculture in both positive and negative ways</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Compare viruses and bacteria 2. Discuss viruses and bacterial diseases affecting plants and animals 	<p>1 week</p>
<p>Unit 8: CELLULAR TRANSPORT</p>	<p>Substances are constantly moving in and out of cells</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the structure of the cellular membrane 2. Compare passive and active transport 3. Compare hypotonic, hypertonic, and isotonic solutions 	<p>2 weeks</p>
<p>Unit 9: BIOLOGICAL CYCLES</p>	<p>Matter cycles through organisms and ecosystems</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the inputs and products of photosynthesis, respiration and fermentation 2. Identify cellular organelles involved in these processes 3. Explain the water, carbon and nitrogen cycles 	<p>2 weeks</p>
<p>Unit 10: DNA STRUCTURE AND REPLICATION</p>	<p>DNA is the basic unit of heredity in all cells</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Describe at least 10 historical achievements in DNA research and technology 2. Explain the structure of DNA 3. Explain how DNA replicates 	<p>1 week</p>
<p>Unit 11: CELL DIVISION</p>	<p>DNA is the basic heredity unit of all cells.</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Identify the stages of the cell cycle 2. Compare prokaryotic and eukaryotic cellular processes 3. Explain how cancer and mutations form 4. Analyze a karyotype and determine abnormalities 	<p>2 weeks</p>

Unit 12: GENE EXPRESSION	<p>DNA is the basic heredity unit of all cells.</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the process of transcription and translation 2. Identify three types of point mutations 	1 week
Unit 13: GENETICS	<p>Selective breeding has produced great variation in plants and animals</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Perform monohybrid and dihybrid punnett square crosses to predict genetic probabilities 2. Analyze complex patterns of inheritance 3. Use a pedigree to analyze genetic inheritance 	3 weeks
Unit 14: BIOTECHNOLOGY	<p>Genetic engineering is a controversial technology being used in agriculture</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the human genome project, cloning, recombinant DNA, stem cells and DNA fingerprinting 	1 week
Unit 15: EVOLUTION	<p>Scientific evidence is used to support the theory of evolution</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Create a geologic time scale showing the origin of life 2. Perform radiometric and relative dating techniques 3. Describe Darwin's theory of evolution and natural selection 4. Identify evidence of evolution 5. Use cladograms and phylogeny to analyze evolutionary relationships 	3 weeks
Unit 16: FFA and SAE	<p>Real-world experimentation and observation in agrbiology is needed to explore career opportunities</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain at least 10 opportunities available to FFA members 2. Perform at least 20 hours toward a Supervised Agricultural Experience project (SAE) 	2 weeks

Agribiology - Unit 01

Unit 1: Lab Safety

Enduring Understandings:

Following safety procedures and using personal protective equipment will reduce the risk of injury.

Specific response techniques must be used in emergencies.

Essential Questions:

What are safe practices for the laboratory?

What personal protective equipment should be used?

How should accidents and injuries be handled?

Unit Goals:

1. Explain the safety rules and proper use of tools used in the Agribiology classroom.

NJCCCS:

5.1.12.B.1, 5.1.12.B.3, 5.1.12.C.1, 5.1.12.D.1, 5.1.12.D.2

Recommended Duration: 1/2 week

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
What are the general safety rules to follow in the laboratory?	Fire safety, emergency evacuation, greenhouse safety, chemical safety, animal safety	Lab Safety pre-test Notes; handouts Streaming video	Class notes via lecture, multimedia presentation, and class discussion, using interactive white board	Building Science Lab safety exam, Animal and Botanical Academy safety quiz
How is equipment safely used?	Personal protective equipment (gloves, goggles, face masks, aprons), wet floor cones, chemical closets, spray paints, pruners/floral knives, landscape equipment, antibacterial soaps	Multimedia presentation using interactive whiteboard	Hands-on activities and cooperative group work such as Safety Equipment Scavenger Hunt Model the use of all safety equipment in the laboratory	Building Science Lab safety exam Animal and Botanical Academy safety quiz

What steps should be taken in the event of an emergency?	MSDS binder, location and use of eye wash, fire blanket and extinguisher, nurse phone number in office	MSDS factsheet	Provide each team of students an MSDS and have them fill in the questions about their chemical	Performance assessment: Read a sample accident report and use an MSDS sheet to handle the situation
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Differentiation

Post study guides and multimedia presentations on teacher maintained web portal for student review/reference. Allow students to re-take the safety test until 100% accurate.

Technology

There are a wide variety of science lab safety video clips that can be used to teach this unit. The use of an interactive white board could be used to show photos of labs where students would locate and then circle on the board the incorrect lab safety procedures. The remote responders can also be used as formative assessment of understanding.

College and Workplace Readiness

Invite a guest speaker such as a laboratory scientist or a health and safety specialist to discuss accident prevention in the laboratory.

Agribiology - Unit 02

Unit 2: Scientific Inquiry and the Characteristics of Life

Enduring Understandings:

Agricultural, environmental and biological issues can be solved using the scientific method.

Essential Questions:

How is the scientific method used to solve problems related to agriculture and the environment?

What are the characteristics of life?

What are the levels of organization used to describe life?

Unit Goals:

1. Perform the 5 steps of the scientific method.
2. Compare the 7 characteristics of living and non-living things.
3. Identify the levels of organization used to describe life.

Recommended Duration: 1.5 weeks

NJCCCS:

5.1.12.D.3

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
How is the scientific method used?	Dependent/independent variables, control group, hypothesis, observations, data collection, data analysis, theory, inference,	Multimedia presentations Labs FFA Agriscience Fair	Streaming video Perform labs utilizing the steps of the scientific method. Real World Application – have students read and identify steps of scientific method in classical and present scientific research Introduce students to the FFA Agriscience Fair guidelines	Vocabulary pre-test Lab - Is Yeast Alive?, Worksheets, unit test, unit project, NJBCT Study questions, Science Journal

What are the characteristics of living things?	Homeostasis, metabolism, sexual/asexual reproduction, stimulus, cells, DNA, growth/development.	Textbook, worksheets, multimedia presentation, Interactive whiteboard, streaming video	Multimedia presentation illustrating the 7 characteristics of living things Show living and non-living examples - use the 7 characteristics to determine if they are living or non-living Compare/contrast living vs. nonliving characteristics	Pre-test vocabulary assessment, Lab - comparing living vs. nonliving things, vocabulary and enrichment worksheets, test, NJBCT study questions, science journal
How is life organized?	Organelles, cells, tissues, organs, organ systems, organisms, populations, communities, ecosystems.	Textbook, worksheets, multimedia presentation, interactive whiteboard, streaming video	Lecture/discussion using multimedia presentation to illustrate levels of organization Chart construction of the levels of organization, and find or draw a picture to represent each level	Pre-test assessment of previous knowledge, enrichment worksheets, Project – create a poster illustrating the levels of organization

Differentiation

Allow students to create poster project in any format they choose, such as poster paper, multimedia presentation, or a streaming video

Students may have choice of enrichment worksheets to do

Unit assessment will have choice of open-ended questions

Technology

Lab reports/graphing in spreadsheet application. Research online current scientific journals of similar topics - read abstracts and add to lab report a summary of findings.

College and Workplace Readiness

The FFA Agriscience Fair CDE provides an opportunity for students to compete against other young scientists in the state in the areas of biochemistry, environmental, food, plant and animal sciences. SAE (Supervised Agricultural Experience) projects can involve job shadowing in various scientific job settings and conducting scientific research. A class science fair could also be held.

Agribiology - Unit 03

Unit 3: Taxonomy

Enduring Understandings:

Classification helps us compare and name organisms.

Essential Questions:

How are organisms classified?

How is binomial nomenclature used?

What are the domains and kingdoms of life?

How can we use dichotomous keys to classify organisms?

Unit Goals:

1. Identify species using scientific nomenclature.
2. Use a dichotomous key to classify organisms.

Recommended Duration: 4 weeks

NJCCCS: 5.3.12.E.2

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
What questions can the teacher use to organize this unit?	What content/themes/skills must the students master as they work within this guiding/topical question?	What resources and materials will the students work with?	What kinds of activities might the teacher facilitate with the students, using the resources, to explore the content/themes/skills?	How will the teacher uncover evidence of student learning? Remember, the assessments should, in total, allow the students to answer all of the essential questions of the unit.

What is taxonomy?	Linnaeus, Classification, Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species	Multimedia presentation, use of interactive whiteboard, streaming video	Lecture/discussion Lab – Classification of everyday items Video streaming showing levels of classification Enrichment worksheets, Project – Research classification levels of 10 New Jersey animals and plant Real World Application – How scientists use classification scheme to identify new organisms	Pre-test assessment, Enrichment worksheets, NJBCT study questions Post-test
How is binomial nomenclature used?	Genus, Species, Botanical Names	FFA Floriculture/Nursery Landscape ID books Field Guides to plants of NJ	Using plant field guides and usda.gov, have students identify plants within the same genera. Identify characteristics that are similar and those that are different.	Project – Compare and contrast native NJ plants, indicating scientific names and their similarities and differences relating to their classification schema
What are the characteristics of domains and kingdoms?	Domains: Achaea, Bacteria, Eukaryote Kingdoms: Archaeabacteria, eubacteria, protista, fungi, plantae, animalia	Multimedia presentation using interactive whiteboard Sample organisms, both alive and preserved Microscope with camera attached to interactive whiteboard	Lecture/discussion noting similarities and differences of different domains and kingdoms Lab - Identify which domain and kingdoms the sample organisms are from Project – Research an organism from each of the six kingdoms	Lab assessment and analysis Project assessment using objective rubric
How are dichotomous keys used?	Dichotomous Key	Shark, Lizard, Dichotomous Key Make your own key using plant or animal models	Lab: Dichotomous Keys	Lab assessment and analysis

Differentiation

Instructor posts review sheets, presentations, and links to the teacher maintained web portal for student review/reinforcement. Extra time on tests. Provide study guides with word banks.

Student choice of materials and modality in classification lab.

Student choice to select any organisms to research within each of the 6 kingdoms.

Student choice to select any 2 out of 3 dichotomous keys

Technology

Video streaming, internet research, remote responders, interactive white board.

College and Workplace Readiness

The FFA Environmental and Natural Resource CDE provide students an opportunity to learn taxonomy of wildlife and tree species.

Agribiology - Unit 04

Unit 4: Ecology

Enduring Understandings:

Ecosystems are complex, involving interrelationships amongst living organisms.

Essential Questions:

How does energy flow through an ecosystem?

How do the interrelationships in an ecosystem affect the stability?

How do natural and human impacts affect ecosystems and biomes?

Unit Goals:

1. Analyze energy flow through a food chain/web.
2. Distinguish characteristics of major biomes.
3. Analyze human impact on the environment.

NJCCCS:

5.3.12.B.1, 5.3.12.B.3, 5.3.12.C.1, 5.3.12.C.2, 5.4.12.G.4

Recommended Duration: 3 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
How do the energy pyramid, food chains, and food webs show the flow of energy in an ecosystem?	Energy flow, 10% rule, herbivores, carnivores, omnivores, producers, primary, secondary and tertiary consumers, food pyramid, chain, web	Multimedia presentation using interactive whiteboard, stationery supplies to create food chains, webs, and energy pyramids, enrichment worksheets, streaming video	Lecture/discussion on energy flow through an ecosystem Build a Food Pyramid with calculations of energy loss Lab – Create your own food web of any ecosystem of your choice. There should be at least 4 trophic levels and at least 12 organisms Introduce FFA Environmental and Natural Resources CDE	NJBCT study questions, Lab reports assessment and analysis, Enrichment formative worksheets, exit cards. Teacher created summative assessment

<p>What interrelationships exist amongst organisms?</p>	<p>Symbiotic relationships, commensalism, mutualism, parasitism, decomposers</p>	<p>Organisms or pictures and summaries of relationships, enrichment worksheets</p>	<p>Set up stations around the class with various organisms and a summary (or photos) - students will rotate and guess the relationship</p> <p>Research – Find 3 examples of each of the symbiotic relationships</p> <p>Project – Create a help wanted poster of any symbiotic relationship</p> <p>Lab - Owl Pellet Dissection</p>	<p>Pre-test vocabulary assessment, exit cards, lab assessment and analysis, NJBCT study questions, review worksheets, post-test</p>
<p>What are natural and human impacts on the environment?</p>	<p>Overpopulation, acid rain, global warming, ozone depletion, erosion, deforestation, loss of biodiversity, consumption, production of food, food security</p>	<p>Streaming video, Multimedia presentation using interactive whiteboard, current events</p>	<p>Earth Day activity</p> <p>Research – What is your Eco-Footprint?</p> <p>Project – identify 3 problems, and what can we do to try and correct?</p> <p>Watershed Ambassador guest speaker</p>	<p>Exit cards, research assessment and analysis, project assessment and analysis, NJBCT study questions, guest speaker write-up</p>

Differentiation

Post power points and notes to instructor maintained web portal for student reinforcement/review.

Provide extra time on tests.

Provide study guides and advance organizers and word banks.

Provide students suggested sources for extension reading and research review.

Student product will have varied analyses based on individual carbon footprints.

Students can be provided a choice of problems in the environment to research and choice of presentation format.

Technology

Video streaming, Internet research, Georgia aged website – (provides practice identification tests for the FFA Environmental and Natural Resource Career Development Event) interactive mimeo boards, multimedia presentations, remote responders.

College and Workplace Readiness

AmeriCorps Watershed Ambassadors are statewide representatives who come to speak to schools about ecological topics. Students have the opportunity to assess stream quality through physical and biological surveys, which could be incorporated as a field trip.

The FFA Environmental and Natural Resources Career Development Event provides an opportunity for students to compete at the state level. This CDE includes identification of wildlife and trees, ecology knowledge exam, use of GPS/GIS technology, etc.

Agribiology - Unit 05

Unit 5: Macromolecules

Enduring Understandings:

All living organisms are made of similar molecules.

Essential Questions:

What are the basic building blocks of life?

What are the macromolecules common to all living organisms?

What is the pH scale?

Unit Goals:

At the conclusion of this unit, students will be able to:

1. Describe the basic chemical structure and function of macromolecules.
2. Test the pH of soil/water/food products.

NJCCCS:

5.2.12.A.1, 5.2.12.A.6, 5.3.12.A.1, 5.3.12.A.2

Recommended Duration: 3 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
What questions can the teacher use to organize this unit?	What content/themes/skills must the students master as they work within this guiding/topical question?	What resources and materials will the students work with?	What kinds of activities might the teacher facilitate with the students, using the resources, to explore the content/themes/skills?	How will the teacher uncover evidence of student learning? Remember, the assessments should, in total, allow the students to answer all of the essential questions of the unit.
What are atoms, elements, molecules and compounds?	Atoms, elements, molecules and compounds	Periodic Table Construction paper to make models	Build a model of oxygen and water showing nucleus, protons, neutrons, electrons, shells	Know-want to know-learn strategy for pre-assessment. Teacher created summative assessments. Assessment models and concept maps, NJBCT study questions

What macromolecules are common to all living organisms?	Monomers, Polymers, Carbohydrates, Proteins, Lipids, Nucleic Acids, ATP	Construction paper to make models	Students create visual or physical representations: chains of paper linked together to show how macromolecules are created, Record notes about each type of macromolecule	Pre-tests with vocabulary self-assessment, evaluation of models by instructor, teacher-created summative unit test, NJBCT study questions
What is pH and how is it measured?	pH, acid, base, alkalinity, neutral	pH test kits Ph probes and soil/food/samples	Perform a pH test on water, soil, or food items Perform a pH change lab using lime and acidifying soluble fertilizers	Remote responder pre-test, review of lab reports, formative Socratic questioning through-out lesson, teacher created summative test, NJBCT study questions

Differentiation

Instructor will post presentations, graphic organizers and assignments on teacher maintained web portal for student review/reinforcement.

Choice of learning stations for pH assessment lab and pH adjustment lab.

Students are presented a choice of modality for their models of molecules and macro molecules.

Technology

Multimedia presentations, streaming video, digital soil pH probes, interactive white board.

College and Workplace Readiness

Tour Rutgers Food Science program and/or invite a professor to come to speak about the role of macromolecules and biochemistry in food production. Perform pH testing on soils and submit soil samples to Rutgers Cooperative Extension to be analyzed in their laboratory - discuss results. Enter an Agriscience Fair project in the FFA State Career Development Event related to biochemistry.

Agribiology - Unit 06

Unit 6: Cell Structure and Organization

Enduring Understandings:

Microscopes are an essential tool used in agribiology to study cells, their organelles and functions.

Essential Questions:

What are the microscope parts and function?

How do cells vary in structure and function?

Unit Goals:

1. Use a microscope to make observations.
2. Compare cell structure of prokaryotes and eukaryotes.

NJCCCS: 5.1.12.D.3, 5.3.12.A.1

Recommended Duration: 4 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
What are the types of microscopes and how are they used?	Compound Light, stereoscope, transmission electron microscope (TEM), scanning electron microscope (SEM) Parts/Functions of Compound Light Microscope: Objective Magnification, Low/High Power Lenses, Coarse/Fine Focus, Diaphragm, Eyepiece, Stage Making a wet mount slide	Multimedia presentations, Interactive white board Microscopes Slides USB camera	Instructor will show photos of microscopic images and ask the students to predict the image. Microscope Comparison Chart. Instructor modeling: making wet mount slides, then students make a plant and an animal cell slide. Compare pre-mounted slides under the microscope	Microscope pre-test, Lab reports, formative worksheets, Microscope safety summative test.

How do prokaryotic and eukaryotic cells compare?	Organelles - identification and function Surface Area to Volume Ratio	Slides of Cells Web access Cell Parts Surface Area/Volume Ratio Lab	Cell Models, Coloring Worksheets, "Cell Like a City" project Cell analogy project Cell model project.	Cell Model review, formative worksheets , Cell Organelle Analogy project
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Differentiation

Heterogeneous pairing of student partners so that students of different abilities can work together on labs for peer-teaching.

Model building or Analogy project choice for cell structures.

Presentations, graphic organizers, and extension activity links will be posted on teacher maintained web portal for students to review and reinforce at their own pace.

Technology

Microscope web cam - use a microscope camera to project images onto the interactive white board.

Cells alive! interactive websites

College and Workplace Readiness

Laboratory skills and a firm grasp of cellular dynamics are applied in many medical, pharmaceutical, and biotechnological Industries. These college and career cluster pathways are integral parts current and growing sectors of our economy.

Agribiology - Unit 07

Unit: Viruses and Bacteria

Enduring Understandings:

Viruses and bacteria impact agriculture in both positive and negative ways.

Essential Questions:

How do viral and bacterial diseases compare?

What positive and negative effects do bacteria have on agriculture?

Unit Goals:

1. Compare viruses and bacteria.
2. Discuss viruses and bacterial diseases affecting plants and animals.

NJCCCS: 5.3.12.A.6

Recommended Duration: 1 week

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
How do bacteria and viruses compare in structure and reproduction?	Bacterial, viral shapes and structure	Multimedia presentations Mycaert materials	Create models of bacterial and viral shapes Create a concept map Research project on specific bacteria, virus, prions	Pre-assessment with teacher lead discussion. Model evaluation, formative Socratic questioning, NJBCT practice questions Teacher created summative test.

<p>What viruses and bacteria affect plants and animals?</p>	<p>Plant diseases, vectors, symptoms, treatment - ex. tobacco mosaic, BT, leaf spot, canker</p> <p>Dog and cat diseases, vectors, symptoms - ex. parvo, rabies, distemper</p> <p>Humans - influenza, anthrax, meningitis, gastroenteritis, the plague, measles, mumps, polio, smallpox, warts</p>	<p>Glencoe interactive website</p> <p>Multimedia presentation of symptoms</p> <p>Diagnosis lab activity</p>	<p>Lab Stations/Rotations</p> <p>1. Veterinary Diagnosis</p> <p>2. Plant Disease Identification</p> <p>3. Human Disease</p> <p>Choice of disease research</p>	<p>Lab Worksheet, Pre-assessment with teacher lead discussion.</p> <p>Model evaluation, formative Socratic questioning, NJBCT practice questions</p> <p>Teacher created summative test.</p>
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Differentiation

Provide multimedia presentations, links, and graphic organizers for student paced review and supplemental extension exercises for student reinforcement/review. Extra time on tests.

Student selection of the type of presentation of research for disease or symbiotic relationship with bacteria, virus or prions.

Technology

Plant and Animal Disease web quest - search online to diagnose dogs, cats, humans and plants affected by viruses and bacteria.

Interactive whiteboard, remote responders.

College and Workplace Readiness

Biotechnology, medicine, and pharmaceutical college path ways and career clusters are in high demand and require mastery of this subject matter.

Agribiology - Unit 08

Unit 8: Cellular Transport

Enduring Understandings:

Substances are constantly moving in and out of cells.

Essential Questions:

What methods are used to move substances into and out of cells?

Unit Goals:

1. Describe the structure of the cellular membrane.
2. Compare passive and active transport.
3. Compare hypotonic, hypertonic, and isotonic solutions.

NJCCCS:

5.3.12.A.3

Recommended Duration: 2 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
What is the structure of the cellular membrane?	Phospholipids, receptor proteins, channel proteins, vesicles	Online animations Text photos CAERT	Watch and take notes on animation of cell membrane - draw a picture and label the parts and functions	Drawings/labels NJBCT questions Test questions
What are the various types of passive and active transport?	Diffusion, osmosis, facilitated diffusion, ion channels, pumps, endocytosis, exocytosis, phagocytosis, pinocytosis	Multimedia presentation, Streaming video	Multimedia presentation notes - support by allowing students to act out the role of molecules moving in and out of the cell using the various transport methods	Worksheets NJBCT questions Test questions
How does a cell maintain homeostasis?	Hypotonic, Hypertonic, Isotonic Solutions, Equilibrium	Egg Lab	Lab: Shrinking/Swelling Egg	Lab questions

Differentiation

Multimedia presentations posted on Moodle for student review/reinforcement. Extra time if needed on tests. Students provided with word bank for cell test.

Technology

MyCAERT E-Units: reading and questions

Internet research

College and Workplace Readiness

Explore the occupational outlook for microbiologists and the various areas of related concentration in career paths related to agriculture. Students should include a job search of current vacancies on monster.com and other online classified occupational vacancy posting sites.

Agribiology - Unit 09

Unit 9: Biological Cycles

Enduring Understandings:

Matter cycles through organisms and ecosystems.

Essential Questions:

What cyclical processes affect living organisms?

Unit Goals:

1. Explain the inputs and products of photosynthesis, respiration and fermentation.
2. Identify cellular organelles involved in these processes.
3. Explain the water, carbon and nitrogen cycles.

NJCCCS: 5.3.12.B.1, 5.3.12.B.4, 5.3.12.B.6

Recommended Duration: 2 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
What is involved in photosynthesis, cellular respiration and fermentation?	Inputs, products and formula, chloroplasts, chlorophyll, mitochondria	Multimedia presentations, Streaming video	Direct instruction, Elodea Photosynthesis Lab, Yeast Lab	Pre-assessment jeopardy. Formative verbal questioning, NJBCT Practice questions Teacher created summative test.
What is the water cycle? carbon cycle? nitrogen cycle?	Water cycle, nitrogen cycle, carbon cycle	Streaming videos, Multimedia presentations, Concept mapping	Create digital concept maps, create board games representing the cycles	Pre-assessment with teacher lead discussion. Board game model evaluation, formative Socratic questioning, NJBCT practice questions Teacher created summative test.

Differentiation

Multimedia presentations posted on teacher maintained web portal for student paced review/reinforcement.

"Guided" lab reports will be utilized.

Cooperative learning opportunities during game development.

Students chose the modality of game boards, paper, manipulative items, playing cards etc.

Technology

Interactive white boards, digital pH probes

Streaming videos, digital concept map software

College and Workplace Readiness

New Jersey Agriscience Fair Career Development Event presents opportunities to explore post secondary options in ecology or resource management.

Also, Forestry and Natural Resource Career Development Event provide opportunities for career skill exploration.

Agribiology - Unit 10

DNA Structure and Replication

Enduring Understandings:

DNA is the basic unit of heredity in all cells.

Essential Questions:

What is the structure and function of DNA and chromosomes?

Unit Goals:

Describe at least 10 historical achievements in DNA research and technology.

Explain the structure of DNA.

Explain how DNA replicates.

NJCCCS: 5.3.12.D.3, 5.3.12.A.6, 5.3.12.D.2

Recommended Duration: 1 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
What scientists have contributed to the advancement of knowledge in genetics?	Famous scientists and historical achievements - ex. Watson and Crick, Chargaff, Dolly the sheep, The human genome project	Cartoon timeline Streaming videos	Students draw and label a timeline of events	Formative questioning, Timeline quiz Summative unit test
What is the structure of DNA?	Nucleotides, deoxyribose, phosphate, nitrogen bases, hydrogen bonding, complimentary pairing	Lab Aids - model DNA kit Strawberry DNA extraction	Build and peer review a model of DNA Strawberry DNA extraction Lab	Model review, Lab report, Instructor created summative unit test
How does DNA replicate?	DNA helicase, polymerase, replication	Lab Aids - model DNA kit Streaming video animation	Watch animation, direct instruction and then use previous model to create a replicated strand of DNA	Formative questioning, summative unit test on DNA history, structure, and replication

Differentiation

Cooperative learning, pair students up for timeline project - elect "artists" as captains and assign students who may have more difficulty with those that can serve as peer mentors.

Multimedia presentations posted by instructor to teacher maintained web portal for student paced reinforcement and review.

Technology

Students will research current uses of DNA technology such as forensic technology, paternity testing, etc. Students will create a technology presentation based on their research.

College and Workplace Readiness

Students can explore the career path of genetic modification of plants (for example, corn and soybeans) for human consumption and discuss/analyze the most likely concerns of consuming genetically modified plants. The FFA Agricultural Issues Career Development event allows for students to create ethical forum to refine beliefs and conceptions and the impact genetic have on current and emerging industries and future career potential.

Agribiology - Unit 11

Cell Division

Enduring Understandings:

DNA is the basic heredity unit of all cells.

Essential Questions:

How do cells reproduce?

How are some diseases a function of genetic mutations?

Unit Goals:

Identify the stages of the cell cycle.

Compare prokaryotic and eukaryotic cellular processes.

Explain how cancer and mutations form.

Analyze a karyotype and determine abnormalities.

NJCCCS: 5.3.12.A.4, 5.3.12.D.3, 5.3.12.A.6, 5.3.12.D.2

Recommended Duration: 2 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
How are cells reproduced?	Binary fission, cell cycle, interphase, mitosis, meiosis, cytokinesis chromosomes, chromatids	Worksheets, video streaming, video animations multimedia presentations	Multimedia presentation with streaming video and animations Coloring mitosis activity Act out the role of the chromosomes in mitosis and meiosis by calling up volunteers	Unit test NJBCT practice questions
How can a karyotype show genetic mutations?	Karyotype, somatic cells, sex chromosomes, gametes, autosomes	Photos of people of chromosomal mutations Karyotype lab	Students view photos of people affected by different chromosomal mutations to learn the characteristics. Students cut apart the chromosomes and form matching pairs. Based on a key, students diagnose chromosomal abnormalities.	Lab report

Differentiation

Peer to peer learning opportunity presented to students. They will pair up for lab for karyotype activity. The instructor will assign students with a strong understanding to pair up with that need additional peer support. Students chose roles (lab reader, reporter, worker, etc.) This will supplement and complement direct instruction.

Technology

Multimedia presentations, web quest and online assessment (MyCAERT).

College and Workplace Readiness

Students explore the career requirements and may invite a guest speaker such as a genetic counselor to present their educational achievements and describe requirements and experiences of that career.

Agribiology - Unit 12

Unit: Gene Expression

Enduring Understandings:

List all of the enduring understandings from the course map/pacing charts.

Essential Questions:

What is the structure and function of DNA and chromosomes?

How do cells reproduce?

How are some diseases a function of genetic mutations?

Unit Goals:

1. Describe the process of transcription and translation.

2. Identify three types of point mutations.

NJCCCS

5.3.12.D.2, 5.3.12.E.1

Recommended Duration: 1 week

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
How does mRNA get transcribed from DNA?	Transcription - nitrogen bases	DNA/RNA models, streaming video, worksheets	Using the DNA models from unit 10, create mRNA strands Direct instruction, multimedia presentations and streaming video animations During a multimedia presentation students may use remote responders to respond to RNA sequences with DNA transcriptions	Formative questioning throughout lesson, Model review of sequence of DNA nitrogen bases, conversion to mRNA, tRNA, and codons and anticodons. Summative unit test and NJBCT practice questions

How does translation occur?	Translation, codons, amino acids,	Codon dartboards Coloring Worksheets	Codon Dartboards - students throw three balls at a velcro dartboard with codons and use codon chart to translate to amino acids Coloring codon activity - fill in vocabulary on diagram and color parts of transcription/translation	Lab reports, Student's record of codons and amino acids, formative questioning Color codon review sheets, Summative unit test
What are the types of point mutations?	Insertion, Deletion, Substitution	Puzzles, keys, Multimedia presentation, articles on mutations	Direct instruction using multimedia presentation, have students solve puzzles showing point mutations Article review/reflection of mutation errors that create health issues	Puzzle answers Practice NJBCT questions summative unit test

Differentiation

Multimedia presentations and study guides are posted on teacher maintained web portal so students may self pace study.

Peer- to- peer learning, may afford students the opportunity to refine understanding of key concepts.

Manipulative models, visual models and narratives may be differentiated student products that may be used as assessments or classroom activities.

Technology

MyCAERT E-Units - Online Reading and Writing Exercises

Interactive white board, remote responders

Internet research

College and Workplace Readiness

Invite a professor, university student or county agricultural agent to discuss plant and animal genetics.

Collaborate with the Monmouth County Biotech High School FFA chapter to do a group learning experience (possible field trip).

New Jersey State FFA Agriscience Fair provides an opportunity to hone biotechnological and medical career skills.

New Jersey State FFA Essay Contest participation.

Agribiology - Unit 13

Genetics

Enduring Understandings:

Selective breeding has produced great variation in plants and animals.

Essential Questions:

How can genetic probability be used in selective breeding of plants and animals?

Unit Goals:

Perform monohybrid and dihybrid punnett square crosses to predict genetic probabilities.

Analyze complex patterns of inheritance.

Use a pedigree to analyze genetic inheritance.

NJCCCS

5.3.12.D.2, 5.3.12.E.1

Recommended Duration: 3 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
How are monohybrid crosses and dihybrid crosses performed?	Alleles, homozygous, heterozygous, recessive, dominant, probability, traits	Streaming videos Practice problem sets Indian Corn Lab	Multimedia presentation and direct instruction Practice sets on the interactive white board and incorporating remote responders Vocabulary games to practice and review crosses Lab - Purple/Yellow corn - perform crosses	Pretest for knowledge with guided discussion. Summative questioning formative quizzes on vocabulary Performance assessment using crosses, summative unit test.

What are complex patterns of inheritance?	Polygenic inheritance, co-dominance, incomplete dominance, blood typing, sex-linked traits, environmental factors affecting traits	Multimedia presentations Practice sets using interactive white board	Game - three teams - problem sets to solve puzzles	Vocabulary Performance Assessment using crosses
How is a pedigree used?	Pedigree, sex-linked traits	Pedigree Puzzles	Demonstrate puzzles then work in teams to solve	Pedigree practicum summative test

Differentiation

Provide word banks and punnett square exercises.

Multimedia presentations posted on teacher's web portal so students may study at their own pace.

Offer students a "menu" of problem sites, student must choose problem sets from that menu.

Technology

Use the interactive white board to practice punnett squares.

Remote responders can be used to reply with mathematically derived populations or descriptive phenotype and genotype answers to problem sets.

College and Workplace Readiness

Genetics is a fundamental topic covered in biology at the collegiate level. Inviting a professor of genetics or plant/animal science to talk about real-world applications of plant and animal breeding will connect students to future growth and learning opportunities.

Career exploration research activity video interview with a geneticist or plant breeder.

Agribiology - Unit 14

Unit 14: Biotechnology

Enduring Understandings:

Genetic engineering is a controversial technology being used in agriculture.

Essential Questions:

What technologies are being used in genetic engineering of plants and animals?

What are the pros and cons of genetic engineering?

Unit Goals:

1. Explain the human genome project, cloning, recombinant DNA, stem cells and DNA fingerprinting.

NJCCCS

5.3.12.A.5, 5.3.12.D.1

Recommended Duration: 1 week

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
How did the Human Genome Project influence genetics?	Comparing Genomes What are benefits and drawbacks of biotechnology?	Streaming Video Video: Ghost Genes Drosophila genome map Arabidopsis genome map	Watch video clip on the Human Genome Achievement - discuss controversies of genetic engineering and mapping genomes. Students are assigned a research and reflection project on the contemporary use of biotechnology. Instructor models a balanced reflection.	Analytical question/Do now question: Is cloning ethical? Formative Socratic questioning. Summative essay about genetic ethics. NJBCT study guide questions.

<p>How are plants and animals cloned?</p>	<p>Tissue culture, Dolly the Sheep, GMO's</p>	<p>University of Utah virtual lab African violets tissue culture lab</p>	<p>Multimedia direct instruction. Virtual lab on computers African violets tissue culture lab</p>	<p>Virtual lab report Formative oral questioning from instructor Summative unit test.</p>
<p>How are stem cells and recombinant DNA being used in scientific research?</p>	<p>Stem cells, pluripotency</p>	<p>PBS video streaming and worksheet about Henrietta Lacks - (Black History Month Lesson) on HELA cells</p>	<p>Instructor lead discussion of stem cells and medical ethics. Students watch streaming video Have students write a reflection about the video.</p>	<p>Socratic questions during discussion, question responses to accompany videos, reflection essay, summative unit test</p>
<p>How do geneticists perform DNA fingerprinting/gel electrophoresis?</p>	<p>Gel electrophoresis, DNA fingerprinting, ELIZA tests</p>	<p>University of Utah - virtual lab</p>	<p>Direct instruction and multimedia presentation. Virtual lab</p>	<p>Virtual lab Worksheet, summative unit test.</p>

Differentiation

Streaming video links and multimedia presentations will be posted to teacher web portal so students may reinforce, and review at their own pace.

Students may choose essay topics from a list of topics and may select the modality of their reflections: written, oral, or multimedia presentation.

Technology

The virtual cloning, electrophoresis labs and stem cell video are a great real-world application of biotechnology. Students perform the labs and are asked to fill in a lab report sheet as they work through the lab. The animation brings the lab to life. The stem cell video shows real world application of scientific research.

Henrietta Lacks - HELA cells video (Black History Month activity)

Internet research

College and Workplace Readiness

The FFA Career Development Events allow students to evaluate industry defined skills sets against their peers. The events below allow students to explore unit topics and the aligned biological and medical careers.

New Jersey FFA Agriscience Fair participation

New Jersey FFA 3-5 Minute Public Speaking Career Development Event participation

New Jersey FFA Agricultural Essay Contest participation

Agribiology - Unit 15

Unit: Evolution

Enduring Understandings:

Scientific evidence is used to support the theory of evolution.

Essential Questions:

What evidence supports the theory of evolution?

Unit Goals:

1. Create a geologic time scale showing the origin of life.
2. Perform radiometric and relative dating techniques.
3. Describe Darwin's theory of evolution and natural selection.
4. Identify evidence of evolution.
5. Use cladograms and phylogeny to analyze evolutionary relationships.

NJCCCS

5.3.12.E.2, 5.3.12.E.3, 5.3.12.E.4, 5.4.12.B.3

Recommended Duration: 3 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
What major events occurred in the history of life on earth?	Geologic eras, mass extinctions, development of life on earth	Vocabulary list Long paper, markers, time scale in textbook Dendrochronology activity	Students are presented a list of terms and create a know, want to know learn chart In teams, draw and label the geologic time scale on long poster paper. Hang one group's paper and highlight/summarize main points as notes. Students are presented a "life of a tree" project and create a poster illustrating climate data, historical events or pop culture events all along a time line.	Pre-test previous knowledge Quiz on eras, mass extinctions and major events. Projects assessed with rubrics

How do scientists estimate the age of living organisms and their fossils?	Relative dating, radiometric dating	Dating Lab	Multimedia presentation and direct instruction. Lab: Relative and Radiometric Dating - determine the age of the fossils through both methods	Lab report Formative questions throughout lab Summative unit test
How did Darwin's exploration of the Galapagos Islands lead to his theory of evolution by natural selection?	Galapagos Islands, finches, natural selection, speciation, antibiotic resistance	Galapagos island nature photos Streaming video: Darwin and the Tree of Life (Monmouth County public library) Streaming video	Show photos from the Galapagos Islands showing variations of bird beaks - ask what "adaptation" the birds have - notes from multimedia presentation Show streaming video, then classroom discussion Antibiotic Resistance multimedia presentation and direct instruction. Lab activity: Widget adaptations	Pretest discussion of Darwin Video/formative questions Lab reports
What evidence exists to support the theory of evolution?	Fossils, vestigial structures, homologous structures, embryos, DNA,	Multimedia presentation Texts- Whale Evolution and Moth evolution over the Industrial revolution	Multimedia presentation and direct instruction. Students read theory of evolution texts and identify evidence of evolution.	Formative questioning Text reflections Summative unit test
How is a phylogeny and cladogram used to determine evolutionary relationships?	Phylogeny, cladograms	Phylogeny and Cladogram	Students create cladograms and predict phylogeny then compare examples to taxonomic order of species.	Cladograms and phylogenetic reports Summative unit tests NJBCT test

Differentiation

Students are presented with choice of “evolution evidence text” and select a topic for their activity.

Students are given a choice of the types of organisms to put in a cladogram.

Technology

Students use multimedia presentation tools to create cladograms.

Internet research

College and Workplace Readiness

Suggestions:

Invite a university professor or graduate student to come and talk to students about Ecology and Evolution.

Assign students to find news articles on the topic of evolution.

Hold a mock "Town Hall Meeting" about whether evolution should be taught in schools - assign roles of scientists, church leaders, biology students, journalists, historians, and others.

Agribiology - Unit 16

Unit: The National FFA Organization and SAE

Enduring Understandings:

Real-world experimentation and observation in agribiology is needed to explore career opportunities.

Essential Questions:

How does experimentation and observation in agribiology develop career interest?

What careers exist in agribiology?

How does FFA prepare students for careers in agribiology?

Unit Goals:

1. Explain at least ten opportunities available to FFA members.
2. Perform at least 20 hours toward a Supervised Agricultural Experience project (SAE).

NJCCCS: 5.1.12.B.1,9.1.12.F.2, 9.4.12.A.3, 9.4.12.A.9, 9.4.12.A.60

Recommended Duration: 2 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
What are the opportunities available to my students? What contacts do we have for agricultural experience projects?	Understand FFA opportunities Components of a supervised agricultural experience	Internet In-person interviews FFA.ORG career search portal	Multimedia presentation and direct instruction Develop with students appropriate interview questions Model the creation of a SAE plan, then guide students in creating a plan Students are instructed in how to create a concept map illustrating the interconnectivity of the career clusters	Students will prepare a portfolio project incorporating at least one interview and one observation outlining how the experience(s) have deepened their understanding of FFA and careers in agribiology. Concept maps of career clusters

Differentiation

Utilize peer learning and in-person interviews with older students and state officers to explore different facets of agriculture-related careers through FFA opportunities for observation.

Students select from SAE learning stations to create an SAE idea report.

Technology

Internet Research

College and Workplace Readiness

Explore the occupational outlook for agriculture-related careers. Students should include a job search of current vacancies on monster.com and other online classified occupational vacancy posting sites.