Syracuse City School District
Career and Technical Education Program
Course Syllabus
NAR100: Natural Resources 100

Program Description

This pathway introduces students to the study of natural resources in an outdoor and classroom setting through hands-on activities and learning. Students will work in groups to investigate and help solve environmental problems and will explore career options in the natural resources pathways. Major areas of study include environmental health, science measurement and skills, ecology, biomes and ecosystems, population studies, tradeoff investigations, and mineral use and identification. Students will develop an integrated view of the biological, ecological and social dimensions of the environment and can earn credits from SUNY-ESF, Syracuse University Project Advance and Onondaga Community College.

Career opportunities include Environmental Engineer/Scientist/Specialist, Natural Science Manager

Course Description

Level 100 introduces students to the ecological studies. Students investigate natural resources. They examine the impact humans have and analyze energy usage. They examine the environmental policies and analyze pros and cons. Exploring the impact the environment can have on health is a key concept. Integrated throughout the course students have opportunity to learn about careers in this field and develop their employability skills, especially working effectively and efficiently in a group.

Course Objectives

1. Students will be able to identify different types of natural resources and describe their uses and any issues surrounding them.
2. Students will be able to describe human impact on the planet's ecosystems.
3. Students will be able to describe the impact of population growth.
4. Students will explain how environmental policies guide use of natural resources.
5. Students will apply skills and knowledge to explain the impact the environment can have on health.
6. Students will demonstrate working in a group and being an effective group member to help solve problems collectively.
7. Students will summarize potential career opportunities in the natural resource field by analyzing field trip and field work experiences.

Integrated Academics

This course will help prepare students to be successful on the Living Environment and/or Earth Science Regents exam if needed.

Equipment and Supplies

• **School will provide**: Field trip opportunities, lab supplies and materials, and any safety equipment when necessary.
• **Student will provide**: Composition notebook to be used as a field journal, 2-3 inch 3 ring binder to be used as the students' working portfolio, plastic sheet protectors.

Textbook

Environmental Science; Houghton, Mifflin, Harcourt 2013

Grading

Students will be provided with several opportunities to show their learning throughout the course. These opportunities will include homework and classwork assignments, vocabulary quizzes, laboratory reports, projects, unit exams, and hands-on lab practical exams.

Additional Course Policies

As with any science course safety is the number one priority for students at all times. Students must follow all safety rules and procedures and any additional safety precautions provided by the instructor. Any failure to comply with safety rules and procedures will result in removal from the classroom for that day and possible removal from the program if the unsafe behavior persists.

Course Calendar

Quarter	Units of Study
1	• Introduction to Science and the Environment • Natural Resources and Energy Resources
2	• Ecology • Populations
3	• Watersheds and Water Quality
4	• Minerals •Environmental Health • The Future • Review/Culminating Activities or Projects

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
NAR 100
Natural Resources 100

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-3 **Introduction to Science and the Environment**	• What is Environmental Science? • What 5 major fields of study contribute to Environmental Science? • How did each stage in human development affect the planet/environment? • What are the main environmental problems throughout history and today? • How do scientists solve problems and communicate their knowledge? • What is a natural resource? • What are types of natural resources? • How are natural resources used and protected?	• Define and explain proper science lab and field safety procedures. • Distinguish between types of resources (renewable, nonrenewable). • Explain that Scientific Inquiry progresses through a continuous cycle of questioning, data collection, interpretation, analysis, and critical review by other scientists (the scientific method). • Define natural resource. • Provide examples of different types of natural resources. • Explain how different types of natural resources are used. • Explain how different types of natural resources are obtained and refined. • Describe how efforts to protect natural resources are implemented. • Debate the need to protect natural resources or to open up greater access to natural resources.	*Labs: Such as* • Lab Safety/Introduction to field study • Let's Graph • Making Metric Measurements and Conversions • Microscope Measurement • Ecological Footprints *Projects such as:* • Scientific Method Project *Assignments such as:* • Chapter Questions • Vocabulary • Skill Builders *Class Work such as:* • Journal Writing • Case Studies • Current Events • Readings and Text based Questions *Tests:* • Chapter and Unit	**Career Ready Practices** CRP 2,4,5 **Cluster Standards** AG 2,3 **Pathway Standards** AG-ENV 1,5	**ELA** 9-10 RI 1,2,3,4,5,6,7,8 9-10 W. 2,6 9-10 SL 1,2,3,4,5,6 9-10 L 1,2,3,4,6 **Literacy** 9-10 RST 1,2,3,4,7 9-10 WHST 2,6 **Math** HSS.IC.A.1 HSS.IC.B.3 **Science** HS.ES 2 HS.ES 3 HS.ETS 1

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
			Quizzes such as: • Vocabulary • Metric Measurement and Conversions • Lab Safety • Graphing *Field Trip/Field Work such as:* • School Grounds • ESF Tully forest		
Weeks 4-10 **Natural Resources and Energy Resources**	• What are renewable and nonrenewable energy resources? • How are fossil fuels formed? • How are fossil fuels used? • What are the consequences of using fossil fuels? • What is nuclear energy? • What is the energy use per country? • How can energy be conserved? • How is energy regulated?	• Name and list renewable energy resources and nonrenewable energy resources. • List types of renewable energy and discuss the advantages and • disadvantages of each. • Explain how fossil fuels are formed and why they are considered nonrenewable. • List the advantages and disadvantages of using nuclear power. • Identify ways in which energy can be conserved in daily life. • Explain energy efficient appliances and compare them.	*Labs: Such as* • Classifying Resources • Household Energy Consumption • Carbon Footprint • Blowing in the Wind • Wind Power *Projects such as:* • Design an Energy Policy • Energy Use Debate *Assignments such as:* • Chapter Questions • Vocabulary • Skill Builders • Monitor Home Energy Use *Class Work such as:* • Journal Writing • Case Studies • Current Events • Readings and Text based	**Career Ready Practices** CRP 1,2,4,5,6,7,8,11 **Cluster Standards** AG 1,2,6 **Pathway Standards** AG-NR 2	**ELA** 9-10 R1,2,3,4,5,6,7,8,9 9-10 W 2,7 9-10 SL 1,2,3,4,6 9-10 L 1,2,3,4,**6** **Literacy** 9-10 RST 1,3,4,7 9-10 WHST 2,6 **Math** HSS.ID.C.9 HSS.IC.B.3 HSS.IC.B.5 HSS.IC.B.6 **Science** HS.ES2 HS.ES3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
			Questions *Tests:* • Unit *Quizzes such as:* • Vocabulary • Energy Efficiency • Map Skills *Field Trip/Field Work such as:* • Fenner Wind farm • Morrisville College		
Weeks 11-18 **Ecology**	• What are the components of an ecosystem? • How do organisms interact in an ecosystem? • What is a biome? • What are the different biomes and what determines them? • How are biomes related to ecosystems? • How do ecosystems change over time? • How do humans affect different ecosystems?	• Describe the biotic and abiotic factors that make up an ecosystem and how they interact. • Describe how energy is transferred through an ecosystem from producers to consumers. • Explain the relationship between producers and consumers. • Describe the cycling of carbon, nitrogen, and phosphorous through an ecosystem. • Identify ways human activities affect the cycling of materials. • Describe the 2 types of ecological succession. • Name and describe the biomes and explain why vegetation is used to classify them. • Describe the diversity of species types on Earth. • Explain why biodiversity is important to ecosystems and humans.	*Labs such as:* • Pond Water Safari • Food Webs • Cycling Nutrients through an Ecosystem • Owl Pellet Dissection • Dichotomous Keys *Project such as:* • Biomes of the World (presentation with PowerPoint or Prezi) *Assignments such as*: • Chapter Questions • Vocabulary • Skill builders *Classwork such as:* • Journal Writing • Case Studies • Current Events • Reading passages with text dependent questions	**Career Ready Practices** CRP 1,2,4,5,8 **Cluster Standards** AG 1,2,6 **Pathway Standards** AG-ANI 5 AG-ENV 2,3	**ELA** 9-10 RSI 1,2,3,4,5,6,7,8 9-10 W 3,6,10 9-10 SL 1,4,5 9-10 L 1,2,3,4,6 **Literacy** 9-10 RST 1,3,4,7 9-10 WHST 2,6 **Math** HSS.ID.C.7 HSS.ID.C.9 HSS.IC.A.1 HSS.IC.B.3 HSS.IC.B.6 **Science** HS.LS2 HS.LS4 HS.ES3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
			Tests: • Chapter • Unit *Quizzes such as:* • Vocabulary • Parts of an Ecosystem • Food Webs • Biomes *Field Trip/Field Work such as:* • Using Field Guides to Identify Local Organisms		
Weeks 19-22 **Populations**	• What are populations? • What limits population growth? • How has the human population changed over time? • How does an increased human population affect finite resources?	• Describe the 3 main properties of a population. • Describe logistic vs. exponential population growth. • Explain how population sizes are regulated in nature. • Explain carrying capacity and limiting factors. • Explain predator and prey relationships and adaptations for survival. • Explain density dependent and density independent limiting factors. • Describe how the human population has changed over the last 200 years. • Describe 3 problems caused by rapid human population growth. • Explain survivorship curves.	*Labs such as*: • Keystone Species Lab • Predator-Prey Relationships • Population Growth • Sampling Methods • Human Population Growth • Calculating Generation Rate *Projects such as:* • • Endangered Species Project (just written) *Assignments such as:* • Chapter Questions • Vocabulary • Skill Builders *Class Assignments such as:* • Case Studies	**Career Ready Practices** CRP 1,2,4,5,7,8,11 **Cluster Standards** AG 1,2,6 **Pathway Standards** AG-NR 1,2,3	**ELA** 9-10 R 1,2,3,4,5,6,7,8 9-10 W 1,2, 5,6 9-10 SL 1,4,5 9-10 L 1,2,3,4,6 **Literacy** 9-10 RST 1,3,4,7 9-10 WHST 2,6 **Math** HSS.ID.C.7 HSS.ID.C.9 HSS.IC.A.1 HSS.IC.B.3 HSS.IC.B.6 **Science** HS.LS2 HS.ES3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
			• Current Events • Reading passages with text dependent questions *Tests such as:* • Chapter • Unit *Quizzes such as:* • Vocabulary • Graphing population data • Map skills *Field Trip/Fieldwork such as:* • Rosamond Gifford Zoo • Fish Hatchery • Sampling Practice (local)•		
Weeks 23-30 **Watersheds and Water Quality**	• What are the parts of the water cycle and how do humans affect each part? • How is our water supply protected? • What is a watershed and how are the boundaries determined? • What is the ozone layer? • What are the causes and effects of pollution? • What causes acid precipitation and what are the effects? • What is climate change and what are the causes and effects? • How do we use land?	• Describe the water cycle. • Discuss the distribution of water on Earth. • Explain why freshwater is a limited resource. • Identify patterns of global water use. • Identify ways water can be conserved. • Describe types of water pollution and their sources. • Explain how to determine water quality. • Describe the laws designed to improve water quality. • Name air pollutants and sources of pollution.	*Labs such as:* • Water Cycle • Water Quality • Ground Water Filtration • pH Lab • Watershed Model • Topographic Maps • Climatographs *Projects such as:* • Public Service Announcement • Persuasive Writing (with debate) • Stream Testing *Assignments such as:*	**Career Ready Practices** CRP 2,4,5,6,7,8,11 **Cluster Standards** AG 1,6 **Pathway Standards** AG-NR 1,2	**ELA** 9-10 RI 1,2,3,4,5,6,7,8,9 9-10 W 2,6 9-10 SL 1,4,5 9-10 L 1,2,3,4,6 **Literacy** 9-10 RST 1,3,4,7 9-10 WHST 2,6 **Math** HSS.ID.C.9 HSS.IC.B.6 HSS.IC.B.5 **Science** HS.ES2 HS.ES3 HS.LS2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	• What is land management and why is it important? • How are policies made surrounding the use of air, water, and land? • What is a tradeoff and what role do they play in making environmental policies?	• Describe how air pollution affects human health. • Explain the cause of acid rain and the effect it has on the environment. • Explain how the ozone shield protects the Earth. • Explain the greenhouse effect. • Explain why the carbon dioxide level of the atmosphere is increasing and name the sources contributing to the increase. • Describe the effects of a warmer Earth. • Determine the pro's and con's of environmental situations and use them to make a decision.	• Chapter Questions • Vocabulary • Skill Builders • Reading passages and text dependent questions *Classwork such as:* • Case Studies • Daily Journal Writing • Current Events *Tests such as:* • Chapter • Unit *Quizzes such as:* • Vocabulary • Graphing • Map Skills *Field/Fieldwork such as:* • Waste Water Facility (Minoa) • Chittenango Falls • Meadowbrook Creek		
Weeks 31-36 **Minerals**	• What is a mineral? • What are the properties of minerals? • How do minerals form? • What uses do we have for minerals? • • What are the environmental impacts of mining minerals?	• Define the term mineral. • Describe the properties of minerals and how to identify minerals based on their properties. • Describe the process by which a mineral forms. • Describe mineral extraction. • Describe the methods used for mining minerals. • Describe the possible environmental impacts of mineral mining and extraction. • Describe the economic	*Labs such as:* • Properties of Minerals • Identifying Minerals • Mining Minerals • Cookie Mining *Projects such as:* • Mining Information Brochure *Assignments such as:* • Chapter Questions	**Career Ready Practices** CRP 1,2,4,5,8,9,12 **Cluster Standards** AG 1,2,6 **Pathway Standards** AG-ENV 2 AG-NR 1,2	**ELA** **9-10 RI** **1,2,3,4,5,6,7,8,9** **9-10 W 2,6** **9-10 SL 1,4** **9-10 L 1,2,3,4,6** **Literacy** **9-10 RST 1,3,4,7** **9-10 WHST 2,6** **Math** HSG.MG.A.2 HSS.IC.B.6 HSS.IC.B.5 **Science**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		impacts of mining for countries. • Describe how the government regulates mining. • Describe the reclamation process.	• Vocabulary • Skill Builders *Classwork such as:* • Case Studies • Daily Journal Writing • Current Events • Reading passages and text dependent questions *Tests such as:* • Unit *Quizzes such as:* • Vocabulary • Identifying Minerals *Field/Fieldwork such as:* • Herkimer Diamond Mines • Museum of Science and Technology • Museum of the Earth		HS.ES2 HS.ES3
Weeks 37-38 **Environmental Health**	• How is solid waste disposed of? • What are the environmental and health related problems caused by landfills and burning trash? • What are biodegradable materials and can they be cost effective? • What are the benefits of recycling? • •How can waste be hazardous to human health? • •What are biological hazards?	• Describe how landfills work. • Name environmental problems caused by landfills. • Identify types of solid waste. • Name the characteristics that make a material biodegradable. • Identify ways by which the amount of solid waste can be reduced. • Describe how consumer buying power can influence solid waste reduction. • Discuss the law of supply and demand. • List the benefits of composting.	*Labs such as:* • Garbage Lab • Composting • Lead Poisoning and Mental Ability • Lyme Disease Risk *Projects such as:* • Recycling Education Campaign *Assignments such as:* • Chapter Questions • Vocabulary • Skill Builders	**Career Ready Practices** CRP 1,2,4,5,6,7,8,9 **Cluster Standards** AG 1,2,6 **Pathway Standards** AG-ENV 2,3	**ELA** **9-10 RI 1,2,3,4,5,6,7,8** **9-10 W 2,6** **9-10SL 1,4** **9-10 L 1,2,3,4,6,** **Literacy** 9-10 RST 1,3,4,7 9-10 WHST 2,6 **Math** HSS.IC.B.5 HSS.IC.B.6 **Science** HS.LS2 HS.ES2 HS.ES3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	• How do environmental changes contribute to an increase in infectious diseases?	• Name characteristics of hazardous waste. • Describe how hazardous waste can be disposed of safely. • Explain how scientists use toxicology and epidemiology. • Describe the relationship between waste, pollution, and human health. • Describe how changes in the environment can lead to changes in infectious diseases.	*Classwork such as:* • Case Studies • Daily Journal Writing • Current Events • Reading passages and text dependent questions *Tests such as:* • Unit *Quizzes such as:* • Vocabulary • Graphing • Map Skills *Field/Fieldwork such as:* • OCCRA • Landfill • Wast to Energy Plant • Composting (local)		
Week 39 **The Future**	• What does sustainability mean? • What does it mean to live sustainably? • How do people determine the value of a product? • What are Environmental Impact Statements and what is their purpose? • How can individuals impact environmental policy?	• Describe some of the challenges of living sustainably. • Explain how economics and environmental science are related. • Explain how economics can limit environmental changes or choices. • Give examples of how private efforts address environmental problems. • Give examples of federal agencies that have environmental responsibilities.	*Labs such as:* • Internet Lab- Making Conservation Profitable • Price Comparison of Going Green *Projects such as:* • Be an Environmental Scientist *Assignments such as:* • Chapter Questions • Vocabulary • Skill Builders *Classwork such as:*	**Career Ready Practices** CRP 1,2,4,5,6,7,8 **Cluster Standards** AG 1,2,6 **Pathway Standards** AG-ENV 2,3 AG-NR 1,2,3	**ELA** **9-10 R 1,2,4** **9-10 W 2,6** **9-10 SL 1,4** **9-10 L 1,2,3,4,6** **Literacy** **9-10 RST 1,3,4,7** **9-10 WHST 2,6** **Math** HSS.IC.B.5 HSS.IC.B.6 **Science** HS.LS2 HS.ES2 HS.ES3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		• Identify ways in which the choices you make as an individual may affect the environment.	• Case Studies • Daily Journal Writing • Current Events • Reading passages and text dependent questions *Tests such as:* • Unit *Quizzes such as:* • Vocabulary *Field/Fieldwork such as:* • Farmers' Market		
Week 40 **Review and Culminating Activities**	• How do we apply this information to real world problems?	• Apply information learned to research an environmental issue or problem and present the findings.	• Final Exam • Research Project and Presentations	**Career Ready Practices** CRP 2,4,5,6,7,8,11	**ELA** 9-10 R 1,2 9-10 W 1,2,5,6,7 9-10 SL 1,4,6 9-10 L 1,2,3,4,6 RI.9-10.1,4,7 RST.9-10.1,3,4,7
				Cluster Standards AG 1,2,6	**Literacy** 9-10 RST 1,3,4,7 9-10 WHST 2,6
				Pathway Standards AG-ENV 2,3 AG-NR 2,3	**Math** HSS.IC.B.5 HSS.IC.B.6
					Science HS.LS2 HS.ES2 HS.ES3

Syracuse City School District
Career and Technical Education Program
Course Syllabus
NAR200: Natural Resources 200

Program Overview

This pathway introduces students to the study of natural resources in an outdoor and classroom setting through hands-on activities and learning. Students will work in groups to investigate and help solve environmental problems and will explore career options in the natural resources pathways. Major areas of study include environmental health, science measurement and skills, ecology, biomes and ecosystems, population studies, tradeoff investigations, and mineral use and identification. Students will develop an integrated view of the biological, ecological and social dimensions of the environment and can earn credits from SUNY-ESF, Syracuse University Project Advance and Onondaga Community College.

Career opportunities include Environmental Engineer/Scientist/Specialist, Natural Science Manager

Course Description

Natural Resources 200 is the second course in the CTE pathway and includes additional hands-on learning opportunities both outdoors and inside the classroom. Students will work in groups to gain knowledge about natural resources, the ways they are used and how they are analyzed. Focus areas include safety, data analysis, soil and plant science, and determining air quality. Student will analysis data to determine treads and to identify needed actions. Creation and interpretation of maps is one tool used during this course. Integrated into all unit is determination of what does this information mean for the future and what are the implications for action.

Course Objectives

- Demonstrate safe practices in classroom, lab and field setting.
- Assess and monitor stream, soil, and forest health.
- Collect and interpret data from field testing.
- Identify native plant species and explain the importance of plants in the ecosystem.
- Interpret and create different types of maps to depict different types of information.
- Discuss current environmental health issues and strategize ways to limit or control an environmental health issue.

Integrated Academics

This course will help prepare students to be successful on the Living Environment and/or Earth Science Regents exam if needed.

Equipment and Supplies

• **School will provide**: Field trip opportunities, lab supplies and materials and any safety equipment when necessary.
• **Student will provide**: Composition notebook to be used as a field journal, 2-3 inch 3 ring binders to be used as students working portfolio, plastic sheet protectors.

Textbook

Environmental Science; Houghton, Mifflin, Harcourt 2013

Grading

Students will be provided with several opportunities to show their learning throughout the course. These opportunities will include homework and classwork assignments, vocabulary quizzes, laboratory reports, projects, unit exams, and hands-on lab practical exams.

Additional Course Policies

As with any science course, safety is the number one priority for students at all times. Students must follow all safety rules and procedures and any additional safety precautions provided by the instructor. Any failure to comply with safety rules and procedures will result in removal from the classroom for that day and possible removal from the program if the unsafe

behavior persists.

Course Calendar

Quarter	Units of Study
1	Safety Rules and Regulations for Field Work Streams Testing and Mitigation Plan.
2	Soil Science: • Soil Components, classifications and soil formation • Nutrients cycled through the soil and identification of living organisms that help the cycling process • Current environmental health issues, their effects on humans and other organisms. • Predicting future environmental health concerns, based on present day patterns and choices.
3	Plant Science: • Plant identification, classifications, and propagation. • Plant Diseases. • Threats to local plant life and plant conservation.
4	Air Quality Mapping: • Maps used in environmental field work. • Map skills and map creation for field work.

Syracuse City School District
Career and Technical Education
Scope and Sequence
NAR200: Natural Resources 200

Time Frame Unit of Study	• Key Questions	Key Learning Targets • (Students will know and be able to)	Assessment • Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-3 **Safety and Regulations for Field Work**	• Why is safety a critical issue? • What steps and protocols are followed for personal safety and safety of others? • What equipment and Personal Protection Equipment (PPE) is needed? • What can you do to prevent accidents or emergencies in the field? • In the event of an accident what reporting is required? • What regulations regarding access and conduct are in place? • Why are regulations in place for specific environmental locations?	• Explain the importance of following safety protocols and regulations. • Demonstrate adherence to safety protocols. • Demonstrate use of PPE. • Describe steps and behaviors to prevent accidents or emergencies in the field. • Summarize steps to take in the event of an accident. • Explain why some fragile environments may have regulations regarding access and activity. • Summarize how regulations may govern access and activities. • Demonstrate safe and respectful behavior to classmates, other adults, and the environment.	• Written assignments • Quizzes and Tests • Student Demonstrates • Teacher Observation	**Career Ready Practices** CRP 1,2,5,9	**ELA** 9-10 R 1,2,4 9-10 W 2,5 9-10 SL 1,4,5,6 9-10 L 1,2,3,4,6
				Cluster Standards AG 3	**Literacy** 9-10 RST 1,2,6 9-10 WHST 2
				Pathway Standards	**Math**
					Science
Weeks 4-8 **Stream Testing and Mitigation Plan**	• What aspects of water quality can be measured? • What determines the quality of the water in a stream? • How can we determine the health of a stream? • What affects the health of a stream? • What role do humans play in the health of streams and their ecosystems? • How can we interpret	• Describe what tests should be done to examine the water quality of a stream. • Interpret the meaning of test outcomes. • Analyze how things like pollution, run off, erosion, buffer zones, watersheds affect the overall health of streams. • Use dichotomous keys to identify macroinvertebrates in local steams and create a food web from the data. • Interpret the data from macroinvertebrate analysis to assess overall stream health..	Labs such as: • Water pollution • Water analysis • Stream formation • Dichotomous keys • Macroinvertebrate Lab Project such as: • Macroinvertebrate collection and ID for DEC, write a report to send to DEC Assignments such as: • Chapter questions	**Career Ready Practices** CRP 1,2,4,5,7,8,11,12	**ELA** 9-10 RI 1,2,3,4,5,6,7,8,9 9-10 W 2, 6,7 9-10 SL 1,3,4 9-10 1,2,3,4,6
				Cluster Standards AG 2,6	**Literacy** 9-10 RST 1,2,3,4,7,9 9-10 WHST 1,2
				Pathway Standards AG-NR 2,3	**Math** N-Q1,2,3 S-IC6 F-IF6 F-LE3 G-GMD3

Time Frame Unit of Study	• Key Questions	Key Learning Targets • (Students will know and be able to)	Assessment • Evidence of Learning	CCTC Standards	NYS Standards
	macroinvertebrate data to get an idea of stream health? • What conservation methods can we utilize to protect streams?	• Identify ways to conserve water and help keep streams healthy.	• Vocabulary • Skill builders Classwork such as: • Case studies • Current events Tests: • Chapter • Unit Quizzes: • Vocabulary Fieldtrip/Fieldwork such as: • Nottingham Campus		G-MG1,2 **Science** HS-LS1 HS-LS2 HS-LS4 HS-ES3
Weeks 9-20 **Soil Science**	• What are the basic components, uses, and properties for soil? • How does soil form and what can affect the formation? • What interactions among living organisms occur within soil? • How does soil affect nutrient cycling? • How do nutrient deficiencies affect output from land and what can be done to manage nutrients within soil? • What can we learn from soil analysis and the processes that occur within and around the soil? • How does desertification occur and how can it be prevented?	• Name the basic components of soil and describe different types of soils that exist. • Describe how soils are classified and what characteristics determine that classification. • Name and describe the uses for soil around the world and in previous cultures. • Describe the soil formation process using the steps outlined in CLORPT. • Utilize data analysis to create a soil map. • Describe which nutrients are cycled through the soil and what living organisms help the cycling process. • Interpret the interactions among the living organisms found within the soil. • Analyze soil for content and be able to list any nutrient deficiencies and their possible	Labs such as: • ID soil types • Porosity and Permeability • Soil Maps • Soil Analysis • The Dust Bowl Assignments such as: • Chapter questions • Vocabulary • Skill builders Classwork such as: • Case studies • Current events Tests: • Chapter • Unit Quizzes such as: • Vocabulary	**Career Ready Practices** CRP 1,2,3,4,5,7,8,11,12 **Cluster Standards** AG 1,6 **Pathway Standards** AG-NR 1 AG-PL 1	**ELA** 9-10 R 1,2,3,4,5,6,7,8 9-10 W 2,4 9-10 SL 1,3,4 9-10 L 1,2,3,4,6 **Literacy** 9-10 RST 1,2,3,4,5,6,7,8,9 9-10 WHST 2 **Math** N-Q 1,2,3 **Science** HS-ESS2 HS-LS4 HS-ES 3

Time Frame Unit of Study	• Key Questions	Key Learning Targets • (Students will know and be able to)	Assessment • Evidence of Learning	CCTC Standards	NYS Standards
		cause. • Develop a plan to manage soil and land use to prevent nutrient deficiencies. • Investigate soil characteristics and processes such as pH, sorption, precipitation, oxidation and reduction reactions, and organic matter within the soil. • Describe the causes and effects of the Dust Bowl.	Fieldtrip/Fieldwork such as: • Nottingham • Campus • Hebeirg Forest (Mr. Ray on advisory board)		
Weeks 21-30 **Plant Science**	• What are the main parts of plants, flowers, and trees? • What are the different classifications of plants? • What characteristics of plants can be used to identify them? • How are dichotomous keys used in the field to identify unknown plants? • How do plants reproduce? • What are the current threats to local plant life in CNY? • What diseases affect plants and how can they be identified? • What are current methods being used to help conserve plants?	• Name and identify the parts of a leaf, flower, and tree. • Determine the different groups of plants and how they are classified. • Use both physical and molecular characteristics of plants to help identify the plant type and name. • Use a dichotomous key to identify leaves and twigs. • Describe different types of reproductive methods used by plants and their success rate. • Identify and determine the consequences of the threats to local plant life. • Develop an action plan to help slow or eliminate the threats to local plant life. • Identify plants with diseases and which disease they have contracted. • Discuss the tradeoffs of current conservation methods for plants.	Labs such as: • Dissecting a flower • Plant types • Plant ID • Dichotomous keys • Disease ID • Plant Conservation Projects such as: • Leaf collection/book • Research project on plant disease Assignments such as: • Chapter questions • Vocabulary • Skill builders Classwork such as: • Case studies • Current events Tests: • Chapter • Unit • Lab Practical Quizzes such as: • Vocabulary	**Career Ready Practices** CRP 2,4,5,7,8,9,12 **Cluster Standards** AG 6 **Pathway Standards** AG-NR 2 AG-PL 2,3	**ELA** 9-10 R 1,2,3,4,5,6,7,8 9-10 W 2 9-10 L 1,2,3,4,6 **Literacy** 9-10 RST 1,2,3,4,5,6,7,8 9-10 WHST 1,2,7 **Math** N-G1 F-IF6 S-IC6 S-ID1-4,9 F-LE3 G-GMD3 G-MG1,2,3 **Science** HS-LS1 HS-LS2 HS-LS4 HS-ES3 HS-ETS1

Time Frame Unit of Study	• Key Questions	Key Learning Targets • (Students will know and be able to)	Assessment • Evidence of Learning	CCTC Standards	NYS Standards
			Fieldtrip/Fieldwork such as: • Nottingham Campus • Local nursery/tree farm		
Weeks 31-35 **Air Quality**	• What are the components of the atmosphere? • What are the causes and effects of air pollution on the environment and human health?	• Describe the atmosphere. • Name the layers and components of the atmosphere. • Name and describe sources of air pollution. • Name and describe effects of air pollution. • Measure	Labs such as: • Layers of atmosphere • Measuring air pollution • Scrubbing for air pollution Fieldtrips/Fieldwork such as: • Covanta	**Career Ready Practices** CRP 1,2,4,8,	**ELA** 9-10 R 1,2,4 9-10 W 2,5 9-10 SL 1,4,6 9-10 L 1,2,3,4,6
				Cluster Standards	**Literacy** 9-10 RST1,2,4 9-10 WHST 2
				Pathway Standards	**Math** **Science**
Weeks 36-40 **Mapping**	• What role do maps play in field work? • What symbols are used on maps? • How are different types of maps used and for what purpose? • Which type of map would you use for different purposes? • How are maps created? • What must be included in a good map when making one? • How do you use a compass with a map?	• Describe situations when you would use a map when doing field work. • Determine how symbols and scales are used on maps and demonstrate how to use them. • Name the different types of maps and the function of each type. • Read different types of maps, including road maps, topographic maps, political maps, climate map, resource map, and thematic maps. • Create your own map using proper scale, direction, and symbols. • Accurately use a map and compass. • Determine pace.	Labs such as: • Map types • Reading maps • Creating maps • Topographic maps • Scales and • Symbols • Using an compass Project such as: • Map Project Assignments such as: • Chapter questions • Vocabulary • Skill builders Classwork such as: • Case studies • Current events Tests: • Chapter • Unit Quizzes such as:	**Career Ready Practices** CRP 1,2,4,5,6,8,11,12	**ELA** 9-10 R 1,2,4 9-10 W 2,4 9-10 SL 1,4 9-10 L 1,2,3,4,6
				Cluster Standards AG 2	**Literacy** 9-10 RST 1,2,3,4,5,7 9-10 WHST 1,2,
				Pathway Standards AG-NR 1	**Math** N-Q 1,2,3 F-IF 4,5,6
					Science HS-ESS 2 HS-ESS 3 HS-ETS 1

Time Frame Unit of Study	• Key Questions	Key Learning Targets • (Students will know and be able to)	Assessment • Evidence of Learning	CCTC Standards	NYS Standards
			• Vocabulary Fieldtrip/Fieldwork: • Nottingham Campus		

Syracuse City School District
Career and Technical Education Program
Course Syllabus
NAR300: Natural Resources 300

Program Overview

This course introduces students to the study of natural resources in an outdoor and classroom setting through hands-on activities and learning. Students will work in groups to investigate and help solve environmental problems and will explore career options in the natural resources pathways. Major areas of study include environmental health, science measurement and skills, ecology, biomes and ecosystems, population studies, tradeoff investigations, and mineral use and identification. Students will develop an integrated view of the biological, ecological and social dimensions of the environment and can earn credits from SUNY-ESF, Syracuse University Project Advance and Onondaga Community College.

Career opportunities include Environmental Engineer/Scientist/Specialist, Natural Science Manager

Course Description

During this course students will learn to identify and manage native New York State wildlife, as well as assisting with the conservation of the ecosystems and wildlife populations of New York State and beyond. Additionally, field work methods and equipment will be utilized to help students gain an in-depth understanding of a career in wildlife biology, population management and other related fields.

Pre-Requisites

Natural Resources 100 and 200

Course Objectives

- Identify and classify animals using classification techniques, tracks and other identifying information.
- Survey the animal kingdom to gain a deeper knowledge of the evolution of animals and how they are adapted for survival.
- Explain wildlife population management techniques and create a plan for a local species of concern.
- Use environmental field work equipment and methods to collect data that can be used in real life projects.

Integrated Academics

1 Science Credit will be earned at the completion of this course.

Equipment and Supplies

- **School will provide***:* Field trip opportunities, lab supplies and materials and any safety equipment when necessary*.*
- **Student will provide:** Composition notebook, writing utensils.

Textbook

Environmental Science; Houghton, Mifflin, Harcourt 2013

Grading

Students will be provided with several opportunities to show their learning throughout the course. These opportunities will include homework and classwork assignments, vocabulary quizzes, laboratory reports, projects, unit exams, and hands-on lab practical exams.

Additional Course Policies

As with any science course, safety is the number one priority for students at all times. Students must follow all safety rules and procedures and any additional safety precautions provided by the instructor. Any failure to comply with safety rules and procedures will result in removal from the classroom for that day and possible removal from the program if the unsafe behavior persists.

Course Calendar

Quarter	Units of Study
1	• Animal Classification • Survey of the Animal Kingdom (part 1)
2	• Survey of the Animal Kingdom (part 2)
3	• Local Animal Identification • Wildlife and Fisheries Management
4	• Field work • Tools of an Environmental Scientist (current environmental issues)

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
NAR 300

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-3 **Animal Classification**	• How can animals be identified and what characteristics determine how they are classified? • What types of animal reproduction exist and how does the type of reproduction effect the continuation of the species? • What role do animals play in ecosystems and natural environments and how do they change those areas? • What types of animal reproduction exist and how does the type of reproduction effect the continuation of the species? • What role do animals play in ecosystems and natural environments and how do they change those areas?	• Determine major animal classification within the Animal Kingdom and the characteristics that define each. • Demonstrate use of dichotomous keys to identify animals. • Describe and analyze the system of animal classifications. • Identify the names of animals using the KPCOFGS • classification system. • Examine animal reproduction and explain how each type is effective for the animal's lifestyle or habitat. • Differentiate between internal and external reproduction and when/why each is used. • Determine animal roles in the environment and identify how they contribute to changes in their natural environments.	Labs such as: • Classify Animals • Dichotomous Keys to ID Animals • Animal • Reproduction Assignments such as: • Chapter questions • Vocabulary • Skill builders Classwork such as: • Case studies • Current events • Journal Writing Tests: • Chapter • Unit • Lab practical Quizzes such as: • Vocabulary Fieldtrip/Fieldwork such as: • Nottingham • Campus • Beaver Lake, ESF Heiberg Forest, Clarks	**Career Ready Practices** CRP 1,2,4,5,7,8,12 **Cluster Standards** AG 1,2,4,6 **Pathway Standards** AG-ANI 1,3,4,6 AG-NR 3	**ELA** 11-12 R 1,2,4 11-12 W 2 11-12 SL 1,4 11-12 L 1,2,3,4,6 **Literacy** 11-12 RST 1,2,3,4,5,6 11-12 WHST 1,2,3,4 **Math** G-MG1,2,3 N-Q-A1,2,3 S.ICB4 S.ICB6 S.MDB7 HSS-IDC9 **Science** HS-LS1,2,4 HS-ESS3 HS-ETS1

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
			Reservation		
Weeks 4-20 **Survey of Animal Kingdom**	• What are the Phyla in the Animal Kingdom? • What characteristics do the animals in each Phyla have in common? • What adaptations are shown in the animals in each Phyla? • How can the animals in each Phyla be identified? • How can cladograms be used to show the evolutionary history of animal development?	• List the major Phyla of animals, including defining characteristics of each one. • Describe how animals found in different Phyla are evolutionary different. • Identify and describe evolutionary relationships as shown in the cladograms. • Use embryology, anatomical, fossil, DNA, and other evidence to support the construction of cladograms. • Describe the population estimation techniques used to gain accurate data on population sizes. • Use data on estimated populations sizes to design wildlife and fisheries management strategies.	Labs such as: • 3D dissections of animal phyla • Dichotomous keys • Population estimation Project such as: • Wildlife Management Plan Assignments such as: • Case studies • Current events • Data collection and analysis Tests: • Lab practical • Unit • Chapter Fieldtrips/Fieldwork such as: • Nottingham Campus • Rosamond Zoo • ESF	**Career Ready Practices** CRP CRP 1,2,4,5,7,8, **Cluster Standards** **Pathway Standards** AG-ANI 6	**ELA** 11-12 R 1,2,4 11-12 W 2,5,6,7 11-12 SL 1,2,4,6 11-12 L 1,2,3,4,6 **Literacy** 11-12 RST2,4 11-12 WHST 2 **Math** **Science**
Weeks 21-23 **Local Animal Identification**	• How can animals be identified and what characteristics determine how they are classified?	• Demonstrate use of dichotomous keys to identify animals. • Defend classification of animals by listing characteristics for classification. • Identify 15 local animals by their scientific name.	• Written assignments • Field Work	**Career Ready Practices** CRP 1,2,4,7,8 **Cluster Standards**	**ELA** 11-12 R 1,2,4 11-12 W 2,5,6,7 11-12 SL 1,2,4,6 11-12 L 1,2,3,4,6 **Literacy** 11-12 RST2,4 11-12 WHST 2,5,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
				Pathway Standards AG-ANI 6	**Math** **Science**
Weeks 24-33 **Wildlife and Fisheries Management**	• What is tracking and why would we want to know how to track animals? • What types of fish are in NY and what adaptations do they have for survival? • What techniques exist for estimating fish population size? • What role has fishing played in civilization throughout history and what role does it currently play in today's society? • What occurrences are affecting fish populations today? • How can fisheries be managed effectively? • What role do fish play in NYS tourism? • What government agencies and programs exist to help monitor fish populations? • What does a fish hatchery do? What are the needs of wildlife for cover, food, water, and living spaces? • What factors, both natural and human created, that affect wildlife populations?	• Define the term "tracking" and explain each type of track and identify animals using their tracks. • Identify all major groups of fish found in NYS and describe the characteristics of each group. • Identify fish caught and found in NYS by sight using identifying characteristics and reference guides. • Name and describe adaptations fish have for survival in different habitats and explain why fish may be found in only selective habitats. • Analyze different habitats to determine which types of fish would live there and why. • Collect fish using various techniques such as trap nets, electrofishing seining, and traditional rod and reel fishing and use that data to predict current fish populations and water quality conditions. • Research and determine the role of fishing throughout history for different civilizations. • Identify current uses for fish in today's culture. • Research and determine the role fishing and fish play in NYS tourism and the economic value of fisheries in NYS.	Labs such as: • Identify animal tracks • Fish Identification • Fish Population Study • Fish Adaptations • Fishing the field (various techniques used) • Identify wildlife habitats and animal needs • Managing wildlife population • Crete ideal wildlife habitat (backyard pollinator garden, insect hotels, other ideas) Projects such as: • Animal Tracking Journal • Trout in the Classroom • Fishing Techniques • Fish Tourism Project (Economic impact of fishing industry in NYS) • Research Project- Wildlife management system (oral presentation) Assignments such as: • Chapter questions • Vocabulary • Skill builders	**Career Ready Practices** CRP1,2,4,5,6,7,8,9,10,11,12	**ELA** 11-12 R 1,2,4 11-12 W 2 11-12 SL 1,2,4,5,6 11-12 L 1,2,3,4,6
				Cluster Standards AG- 1,2,3,4,5,6	**Literacy** 11-12 RST2,4 11-12 WHST 2,5,6,7
				Pathway Standards AG-ANI 1,2,3,4,5,6 AG-ENV 2 AG-NR 1,2,3,4	**Math** N-Q. A1,2,3 HSS-MD.B5,6,7 HSS-IC.A1 HSS-IC. B3,5,6 HSS-ID. A 2,3,4,9 HSS-ID.C9 F-LEA.IB,IC

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	• What are the 4 major goals of wildlife management systems? • What federal, state, and local municipalities work to manage wildlife populations? • What is the importance of habitat management and monitoring land use patterns in maintaining wildlife populations? • What management options exist for different wildlife habitats? • What role do humans play in everyday wildlife population control? • What career opportunities exist in the field of wildlife management?	• Determine the government agencies involved in managing NYS fisheries. • Describe the role fish hatcheries play in maintaining healthy NYS fisheries and researching fish populations and diseases. • Identify and describe any causes of fish decline and explain the impact fish decline has on the ecosystem and humans. • Determine the basic needs of animals given their native habitat. • Determine any/all threats to animals within their native habitats using a cause-and-effect framework. • Name and describe the 4 major goals of wildlife management systems and how these goals manage wildlife populations. • Name and describe federal, state, and local municipalities and their management efforts to control wildlife populations. • Assess the importance of managing land properly and its role in wildlife management and habitat conservation/protection. • Analyze a habitat to determine which option for habitat conservation is best used for wildlife management. • Identify and research potential careers in wildlife management systems.	• Classwork such as: • Case studies • Current events • Journal writing Tests: • Chapter • Unit Quizzes such as; • Vocabulary Fieldtrips/Fieldwork such as: • Outdoor areas for tracking • Nottingham Campus • Barry Park • Onondaga Lake • Oneida Lake • Fish Hatchery • Certified local habitats		**Science** HS-LS 1,2,3,4 HS-ES 2,3 HS-ETS 1
Weeks 34-37 **Field Work**	• What safety precautions should be taken when	• Determine which safety precautions should be taken.	Labs such as: • Equipment ID	**Career Ready Practices** CRP 1,2,4,7,8	**ELA** 11-12 R 1,2,4 11-12 W 2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	conducting field work in various environments? • How can each piece of field equipment be used and what data can be collected? • How can data be collected, analyzed, and represented for peer review?	• Identify and correctly use all safety equipment. • Identity by name field work equipment. • Describe the use of each piece of field equipment. • Correctly use each piece of field equipment. • Accurately collect, organize, and analyze data that is collected. • Draw conclusion based on data and describe the need for peer preview practices.	• Data Collection • Field Safety Projects such as: • Research Project with Data Collection Assignments such as: • Case studies • Current events • Data analysis • Practice problems Tests: • Chapter • Unit • Lab practical Fieldtrip/Fieldwork such as: • Nottingham campus • Green Lakes State Park		11-12 SL 1,2,4,5,6 11-12 L 1,2,3,4,6
				Cluster Standards AG 3	**Literacy** 11-12 RST 2,4 11-12 WHST 2
				Pathway Standards	**Math**
					Science
Weeks 38-40 **Tools of an Environmental Scientist (Current Environmental Issues)**	• What are the major environmental issues today? • How have environmental issues changed over time? • What laws or regulations have been successful in lessening or mitigating environmental issues? • What methods could be used to control new environmental issues? • What tools can be used to help regulate, manage and mitigate new environmental issues?	• Identify and describe the most important environmental issues of today. • Determine the causes and effects of current environmental issues. • Identify and describe government efforts to address environmental issues. • Identify and describe any roadblocks to addressing environmental issues.	• Written assignments • Presentations	**Career Ready Practices** CRP 1,2,4,5,6,7,8,12	**ELA** 11-12 R 1,2,4 11-12 W 2 11-12 SL 1,2,4,5,6 11-12 L 1,2,3,4,6
				Cluster Standards AG 1	**Literacy** 11-12 RST 2,4 11-12 WHST 2
				Pathway Standards AG-ENI 1,2,4	**Math**
					Science

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	• What roadblocks or challenges are there to addressing environmental issues?				

Syracuse City School District
Career and Technical Education Program
Course Syllabus
NAR400: Natural Resources 400

Program Overview

This course introduces students to the study of natural resources in an outdoor and classroom setting through hands-on activities and learning. Students will work in groups to investigate and help solve environmental problems and will explore careers options in natural resources pathways. Major areas of study include environmental health, science measurement and skills, ecology, biomes and ecosystems, population studies, tradeoff investigations, and mineral use and identification. Students will develop an integrated view of the biological, ecological and social dimensions of the environment and can earn credits from SUNY-ESF, Syracuse University Project Advance, and Onondaga Community College.

Career opportunities include Environmental Engineer/Scientist/Specialist, Natural Science Manager

Course Description

During this course students will explore NYS agriculture and food science, forestry, landscaping, sustainability systems, current environmental health issues, as well as the economics and ethics of governmental policies and ways of doing business within the realm of natural resources. The course culminates with students researching a current topic of interest.

Pre-Requisites

Successful completion of Natural Resources 100, 200 and 300 courses

Course Objectives

Students will:
• Determine sustainable agriculture practices.
• Apply skills and knowledge to create a tourism program that highlights NYS agriculture and products.
• Demonstrate use of proper landscaping techniques and terminology to design a landscape to meet a customer's request.
• Explain the interactions between natural resources, economics, and ethics.
• Design a plan that meets all ethical, economic, and sustainability guidelines for a topic of interest in the field of natural resources.
• Develop an action plan for current environmental issue based on data and research

Integrated Academics

1 ELA credit

Equipment and Supplies

- School will provide: Field trip opportunities, lab supplies and materials and any safety equipment when necessary.
- Student will provide: Composition notebook, writing utensils

Textbook

Environmental Science; Houghton, Mifflin, Harcourt 2013

Grading

Students will be provided with several opportunities to show their learning throughout the course. These opportunities will include homework and classwork assignments, vocabulary quizzes, laboratory reports, projects, unit exams, and hands-on lab practical exams.

Additional Course Policies

As with any science course, safety is the number one priority for students at all times. Students must follow all safety rules and procedures and any additional safety precautions provided by the instructor. Any failure to comply with safety rules and procedures will result in removal from the classroom for that day and possible removal from the program if the unsafe behavior persists.

Course Calendar

Quarter	Units of Study
1	• NYS and US Agriculture and Food Science • Agricultural Biotechnology
2	• Sustainability Systems in Natural Resources and Agriculture
3	• Economics and Ethics of Natural Resource Systems • Forest and Land Management
4	• Environmental Current Issues

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
NAR 400

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-5 **NYS and US Agriculture and Food Science**	• What essential nutrients are necessary for the growth of crops? • What nutrients are limiting factors? • What is crop rotation and what use does it have in growing crops? • What are fertilizers and how do they work? • How do fertilizers lead to nutrient pollution? • How is irrigation used for crops? • Who regulates the use of farm land in the USA and NY? • Why are pollinators important and why should we save the bees? • What does "Certified Organic" mean and what are the requirements for "organic"? • What other resources do farms consume? • What environmental issues are created by modern agricultural practices? • What risks are associated with food production and	• Determine the necessary nutrients for successful crop growth. • Describe the use of crop rotation and explain the reasons crops are rotated. • Name and describe different types of fertilizers and explain how fertilizers work. • Determine the best type of fertilizer based on research and needs of a particular field or crop. • Explain what nutrient pollution is and determine the cause and effects. • Describe the different types of irrigation systems and their effectiveness. • Calculate water use efficiency and determine ways to increase this figure. • Compare and contrast commercial farming and local farming and determine the effect on the local, country, and global economy of each type of farm. • Explain the purpose of government organizations and policies in the agriculture business including the FDA and USDA. • Explain the importance of bees	Labs such as: • Agriculture Land Use • Concentrate the Solution • Fertilizer and the Environment • Plant Nutrient Deficiencies • Plant-Soil Interactions • Know Your Nitrogen • Souring Milk • Coliform Counts • Chain of Food, Energy and the Commodity Trace Back • Conserving Bumble bees • Food Science-Bread Dough Challenge Project such as: • Farm to Table Economic Impact Assignments such as: • Chapter questions • Vocabulary • Skill builders Classwork such as:	**Career Ready Practice** CRP 1,2,4,5,6,7,8,9, 10,11,12 **Cluster Standards** AG-1,2,3,5,6 **Pathway Standards** AG-ANI1,2,3,4,5,6 AG-ENV2 AG-NR1,2,3	**ELA** **11-12 R 1,2** **11-12 W 2** **11-12 SL 1,2,4** **11-12 L 1,2,3,4,6** **Literacy** 11-12 RST.1,2, 3,8,9 11—12 WHST 1,2,4,6 **Math** NQ-A1 HSSMD-B5,6,7 HSSIC-B3,5,6 HSSID-A2,3,4 HSSID-C9 **Science** HS-LS2,3,4 HS-ES3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	consumption? • What agricultural practices are currently used to raise livestock? • What agricultural products are most important for the NYS economy and how are those products developed?	and other pollinators and the effect on food production as a result of their decline. • Determine the causes of the decline of bees. • Determine the resources farms use and calculate the amount, including energy, water, land, etc. • Determine the risks associated with producing food, transporting food, and consuming food for both the farmer and the consumer. • Track a NYS agriculture product from farm to table and determine economics of that product.	• Case studies • Current events • Journal Writing Tests: • Chapter • Unit • Lab practical Quizzes such as: • Vocabulary Fieldtrip/Fieldwork such as: • Nottingham Campus • Brady Faith Farm or Jubilee Farms (urban farm sites in Syracuse) • Restaurant that uses "farm to table" practices		
Weeks 6-10 **Agricultural Biotechnology (Agritech)**	• Why does agritech exist and what role does it serve in modern agriculture? • What is the goal of agritech? • What is the history of agritech?	• Determine the overall use and goal of biotechnology in agriculture by tracing its history through time • Determine how each technique is used and what the goal/outcome of each will be, including crossbreeding, mutagenesis, polyplody, protoplast fusion, RNA interference, transgenics,	Labs such as: • DNA extraction • Food Label Analysis • Crossbreeding Analysis Project such as:	**Career Ready Practices** CRP 1,2,4,5,6,7,8,9,10,11,12 **Cluster Standards** AG-1,2,3,6	**ELA** 11-12 R 1,2,4 11-2 W 1,2,5,6 11-12 SL 1,2,4 11-12 L 1,2,3,4,6 **Literacy** 11-12 RST 1,2,4,7 11-12 WHST 1,2,5,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	• What techniques does agritech include and what is the purpose /outcome of each technique? • What effect does agritech have on the nutritional content of the crop? • What concerns or issues do GMO and agritech raise for human consumption? • What are the safety testing and regulations used to assure GMO's and agritech crops are safe for human consumption? • What federal, state, and local municipalities work to control agritech and the use of GMO's? • What jobs exist in the agritech field?	genome editing. • Analyze the nutritional content of GMO's and compare that content to organic (non-GMO food products). • Analyze the public health concerns of consuming GMO's and address each concern using data collections and analysis. • Identify all government agencies involved in agritech regulations and determine the role each plays. • Research job opportunities in the agritech field.	• Debate-research both sides of the issue and present evidence for both Assignments such as: • Chapter questions • Vocabulary • Skill builders Classwork such as: • Case studies • Current events • Journal Writing Tests: • Chapter • Unit • Lab practical Quizzes such as: • Vocabulary Fieldtrip/Fieldwork such as: • College campus to visit DNA lab • Local farm using agritech techniques	**Pathway Standards** AG-NR 1,2,3 AG-FD 2,4 AG-PL 1,2	**Math** HSSIC-5,6 HSSMD-B5,6,**7** **Science** HS-LS 1,2,3,4
Weeks 11-20 **Sustainability Systems in Natural Resources and Agriculture**	• What does sustainability mean and what does it apply to? • What is your definition of sustainability? • Why is sustainability important and what role does it currently play in environmental issues?	• Define sustainability in several different ways. • Create your own working definition of sustainability. • Identify places where sustainability is applied, encouraged, or necessary. • Determine the importance of	Labs such as: • Sustainable versus not sustainable Project such as: • Design an environmental outreach program to	**Career Ready Practices** CRP 1,2,4,5,6,7,8,9,10,11,12 **Cluster Standards** AG-1,2,3,4,6	**ELA** 11-12 R 1,2,4 11-2 W 1,2,5,6 11-12 SL 1,2,4 11-12 L 1,2,3,4,6 **Literacy** 11-12 RST 1,2,4,7 11-12 WHST 1,2,5,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	• What government policies, programs and organizations exist that help promote, regulate and control sustainability?	sustainability practices in multiple environmental science and natural resource fields. • Identify and discuss the government agencies that promote and encourage sustainability, and describe programs that support sustainability efforts.	promote sustainability Assignments such as: • Chapter questions • Vocabulary • Skill builders Classwork such as: • Case studies • Current events Tests: • Chapter • Unit • Lab practical Quizzes such as: • Vocabulary Fieldtrip/Fieldwork such as: • Nottingham Campus	**Pathway Standards** AG-NR 1,2,3 AG-ENV 2	**Math** HSSMD-B5,6,7 NQ-A1 HSSIC-B3,5,6 **Science** HS-LS2,4 HS-ES 2,3 HS-ET 1
Weeks 21-26 **Economic and Ethics of Natural Resource Systems**	• What are the laws of supply and demand and how are they related to our natural resources? • How are our natural resources currently allocated and who has control over this allocation process? • What is the overall goal of allocating resources? • How are the economy and natural resources interconnected? • How can we run an economy while taking	• Explain the laws of supply and demand in relation to specific natural resources (water, land, minerals, etc.). • Determine who has the authority to allocate resources and analyze how they make decisions. • Examine how the allocation of resources effects an economy (both local and national level). • Determine the effects of limited resources on an economy. • Explain the 3 pillars of sustainability and how they are interconnected.	Labs such as: • Supply and Demand • Ethics 101 Project such as: • Research project on a "hot topic" in ethics and natural resources Assignments such as: • Chapter questions • Vocabulary • Skill builders	**Career Ready Practices** CRP 1,2,4,5,6,7,8,9,10,11,12 **Cluster Standards** AG-1,2,3,4,6 **Pathway Standards** AG-ENV 2 AG-NR 1,2	**ELA** 11-12 R 1,2,4 11-2 W 1,2,5,6 11-12 SL 1,2,4 11-12 L 1,2,3,4,6 **Literacy** 11-12 RST 1,2,4,7 11-12 WHST 1,2,5,6,7 **Math** HSSID-C9 HSSIC-B3, HSSMD-B5,6,75,6 **Science** HS-LS2,4

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	into consideration the limitations of our natural resources? • What are the 3 pillars of sustainability and how are they interconnected? • How are recreational, commercial, and social policies considered when developing policies on natural resource allocation and use? • What do the terms perpetual and exhaustible mean in terms of natural resource use and allocation? • What ethical considerations should be made when developing policies about natural resources and their use and allocation? • What governmental agencies currently work in developing these policies?	• Determine the role recreation and commercial factors play when developing policies regarding the allocation and use of natural resources. • Define terms perpetual and exhaustible in the realm of natural resources and explain how these terms affect policy making decisions. • Define the term "ethical" and relate the term to policies designed to manage natural resources. • Determine and examine the governmental agencies involved in making policies surrounding the use and management of our natural resources.	Classwork such as: • Case studies • Current events • Journal Tests: • Chapter • Unit Quizzes such as: • Vocabulary Fieldtrip/Fieldwork such as:		HS-ES2,3 HS-ET1
Weeks 27-30 **Forest and Land Management**	• What is the ecology of a forest ecosystem? • How can you determine which trees are best suited for the ecosystem and environment at present? • How can forests be managed in terms of establishment, composition, growth, and density to ensure the healthiest forest ecosystem? • What reproduction methods exist for stand reproduction?	• Describe a forest ecosystem in ecological terms including the role of each type of tree present. • Identify and explain the limiting factors for tree growth and establishment. • Determine which trees are biologically and economically suited for a forest site. • Explain how forests can be regenerated both naturally and artificially. • Describe reproduction methods for stand regeneration and	Labs such as: • Forest Ecology Study • Assessing soil composition • Tree identification by leaf, twig, bark and visual of entire tree • Collecting "tree data" and "mapping tree data" using GIS • Determining the height of a tree • Estimating the amount of standing	**Career Ready Practices** CRP 1,2,4,5,6,7,8,9,10,11,12 **Cluster Standards** AG 2,6 **Pathway Standards** AG-ENV 3 AG-NR 1,2,3,4 AG-PL 1.2.3.4	**ELA** 11-12 R 1,2,4 11-2 W 1,2,5,6 11-12 SL 1,2,4 11-12 L 1,2,3,4,6 **Literacy** 11-12 RST 1,2,4,7 11-12 WHST 1,2,5,6,7 **Math** HSSIC-B3,5,6 GMG-A1 HSSMD-B5,6,7 NQ-A1 **Science** HS-LS 1,2,4

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	• How can you determine which forest product the market needs and you can produce? • How can you ID trees? • How can timber cruising be used to estimate the amount of standing timber in a forest? • What tools are used in forest management? • How is firewood produced from start to finished product? • How can you assess a site for landscape needs? • How can you create a landscaping plan? • How can you determine which types of plants • should be planted based on needs? • What should be done to assure that newly planted plants and trees become established? • What kinds of care do trees require?	discuss positive and negative aspects of each. • Create a research plan to determine which tree products are marketable and can be grown in your ecosystem and environment. • Identify trees using leaves, twigs, bark, and visual of the whole tree. • Estimate the height of a tree using a clinometer. • Estimate the amount of standing timber in a stand using timber cruising and accurate measurements. • Use GIS to create a map of a stand of trees after collecting data and measurements. • Discuss tool use and maintenance when logging (chain saw). • Describe methods to fell trees safely. • Describe the process of creating firewood from start to finish. • • Assess a site for landscaping needs including soil composition, sunlight, water availability, and animal interactions. • Determine hydrozones within the landscape area and determine which plants should be planted in each hydrozone based on needs. • Assess the needs of the plants before deciding when and where to plant them in a landscape plan. • Apply your research and gathered information plant and create the landscape plan.	timber in a forest using timber cruising Project such as: • Landscape Plan (determine need, soi and climate characteristics, hydrozones, desired outcomes, adhere to budget restrictions, implement planting schedule and design) • Leaf Litter Data Collections with Dr. Ruth Yanai from ESF • Assignments such as: • Chapter questions • Vocabulary • Skill builders Classwork such as: • Case studies • Current events • Journal Tests: • Chapter • Unit Quizzes such as: • Vocabulary Fieldtrip/Fieldwork such as: • Nottingham Campus		

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
			• Local nursery/tree farm • Heiberg Forest • ESF-Dr. Yanai as quest speaker		
Weeks 31-40 **Environmental Current Issues**	• What are the current environmental health issues we face today? • What are the effects of these environmental health issues on humans and other organisms? • What can we do to help limit or eliminate the risks associated with these environmental health issues?	• Identify current health issues (including lead contamination, zika virus, Ebola, flu strains, diabetes, cancer, and other diseases or issues). • Examine how humans are affected by each health issue. • Describe how each health issue affects other organisms • Develop an action plan to help limit or eliminate one cause of an environmental health issue. • • Predict future health issues based on present day environmental patterns or choices.	Labs such as: • Mapping diseases • Spreading infectious diseases • Predict Life Span Project such as: • Informational brochure on health issue Assignments such as: • Chapter questions • Vocabulary • Skill builders Classwork such as: • Case studies • Current events • Journal Tests: • Chapter • Unit Quizzes such as: • Vocabulary Fieldtrip/Fieldwork such as: • Nottingham Campus • Health Clinic	**Career Ready Practices** CRP 1,2,4,5,8,12 **Cluster Standards** AG-1,2 **Pathway Standards** AG 1,4,5 AG-NR 2	**ELA** 11-12 R 1,2,4 11-2 W 1,2,5,6 11-12 SL 1,2,4 11-12 L 1,2,3,4,6 **Literacy** 11-12 RST 1,2,4,7 11-12 WHST 1,2,5,6,7 **Math** N-Q 1,2,3 F-IF 4,6 F-LE 3 S-ID 1,2,3,4,9 S-IC 1,2,3,6 **Science** HS-ES 2,3 HS-L 4