
Plant Science

Curriculum Map

School Year: 2021-2022

School: Southern Cayuga Jr./Sr. High School

Program: Agricultural Sciences

Teacher: Ms. Wasson

Course Rationale:

This course is designed to expose students to agriculture, plant science, and related career options. Students participating in the course will have experiences in various plant science concepts with hands-on activities, projects, and problems. Students' experiences will involve the study of plant anatomy and physiology, classification and the fundamentals of production. Students will work on major projects and problems similar to those that plant science specialists, such as horticulturalists, agronomists, greenhouse and nursery managers, and plant research specialists, face in their respective careers.

The course is structured for all students to experience plant science. The knowledge and skills students develop can be used within multiple pathways of study.

Standards:

Life Science

- LS1.A: Structure and Function
- LS1.B: Growth and Development of Organisms
- LS1.C: Organization for Matter and Energy Flow in Organisms
- LS2.A: Interdependent Relationships in Ecosystems
- LS2.B: Cycles of Matter and Energy Transfer in Ecosystems
- LS2.C: Ecosystem Dynamics, Functioning, and Resilience
- LS2.D: Social Interactions and Group Behavior
- LS3.A: Inheritance of Traits
- LS3.B: Variation of Traits
- LS4.A: Evidence of Common Ancestry and Diversity
- LS4.B: Natural Selection
- LS4.C: Adaptation
- LS4.D: Biodiversity and Humans

English Language Arts

- RST.9-10.1 – Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- RST.9-10.3 – Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- RST.9-10.7 – Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- RST.9-10.8 – Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

Course Outline:

Title or Topics / Essential Questions	Content Skills (Activities to cover Essential Questions)	Vocabulary	Major Assessments	Time Frame
<p>Plants in Human Context</p> <p>How were plants introduced to cultures and civilization?</p> <p>Why are plants essential to life?</p> <p>How have consumer preferences evolved the plant industry?</p>	<p>Explain and analyze the contributions of plants and plant use in cultures, civilization, and communities.</p> <p>Identify and compare cultural and production practices in the cultivation, research, processing, and distribution of plants for human and animal use.</p> <p>Investigate factors that lead to consumer preferences, perceptions, choice, access, and affordability of plants, plant derived products.</p>	<p>Origins, Derived, Demand, Distribution, and Preferences, Perception.</p> <p>Collaborate, Determine, Explain, Identify, and Interpret.</p>	<p>Post-test: The Value of Plants to Society</p> <p>Evaluation Rubric: Origins of Plants and Plant Products Project</p> <p>Evaluation Rubric: Origins of Plants and Plant Products Presentation</p>	<p>4 – 5 Weeks</p>
<p>Plant Anatomy and Physiology</p> <p>How can a complete plant be distinguished from an incomplete plant?</p> <p>How does the anatomy of the plant aid in processes?</p> <p>What environmental factors are essential in processes that occur throughout the plant?</p> <p>How does the physiology of the plant aid in processes?</p>	<p>Evaluate flower structures and analyze the impact of plant structure on plant breeding, production and use.</p> <p>Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.</p> <p>Compare and contrast the effects of transpiration, translocation and assimilation on plants.</p> <p>Analyze how various environmental factors will affect the rate of photosynthesis.</p>	<p>Complete, Cellular Respiration, Dicotyledons, Herbaceous, Hierarchical Classification, Imperfect, Incomplete, Meiosis, Mitosis, Morphological, Monocotyledons, Ornamental, Perfect, Photosynthesis, Taxonomic, Transpiration, and Translocation.</p>	<p>Plant Structures Dissection Lab</p> <p>Post-test: Plant Structures</p> <p>Evaluation Rubric: Plant Structures Project</p> <p>Investigating Photosynthesis Lab</p> <p>Hunt for Glucose Lab</p> <p>Evaluation Rubric: Coffee Production Project</p>	<p>4 – 5 Weeks</p>

	Apply knowledge of plant physiology and energy conversion to plant systems.	Collaborate, Determine, Explain, Identify, and Interpret.	Post-test: Plant Processes	
<p>Plant Propagation</p> <p>What is the difference between asexual and sexual propagation?</p> <p>What are the techniques to propagate a plant?</p> <p>What are environmental factors that affect the success of asexual and sexual reproduction?</p>	<p>Discuss the importance of sexual propagation in plants.</p> <p>Summarize optimal conditions for asexual propagation.</p> <p>Demonstrate techniques used to propagate plants by cuttings, division, separation, layering, budding and grafting.</p> <p>Manage the plant environment to support asexual reproduction.</p> <p>Demonstrate plant propagation techniques in plant system activities</p>	<p>Asexual propagation, Budding, Cross-Pollination, Cutting, Division, Germination, Grafting, Layering, Pollination, Propagate, Separation, Viability and Vigor.</p> <p>Collaborate, Determine, Explain, Identify, and Interpret.</p>	<p>Propagation Lab</p> <p>Plants on the Move – Transplanting Lab</p> <p>Evaluation Rubric: Propagate Like a Pro Project</p> <p>Practices of Grafting Application Lab</p> <p>Evaluation Rubric: Grafting Apple Trees Project</p> <p>Post-test: Plant Propagation</p>	5 – 6 Weeks
<p>Soil and Plant Production</p> <p>What components of growing media support plant growth?</p> <p>How do physical and chemical characteristics of growing media influence plant growth?</p>	<p>Identify the major components of growing media and describe how growing media support plant growth.</p> <p>Describe the physical and chemical characteristics of growing media and explain the influence they have on plant growth.</p>	<p>Fertilizers, Growing Media, Nitrogen, Nutrient Deficient, NPK, pH, Phosphorus, Potassium, Soil Horizon, and Soil Profile.</p> <p>Collaborate, Determine, Explain, Identify, and Interpret.</p>	<p>Soil Observations Lab</p> <p>Evaluation Rubric: Physical and Chemical Properties of Soil Project</p> <p>Evaluation Rubric: Conducting a Soil Test and Mapping Results</p>	5 – 6 Weeks

How are plant regulators used to influence growth of the plant?	Identify environmental factors and effects of plant regulators. Develop and implement a management plan for plant production.		Evaluation Rubric: Agriculture Biome Project Post-test: Soil and Plant Production	
Plant Biotechnology What is germination rate? How can you measure germination rate? What is a genetically modified organism? What are risk and advantages of GMO's? What is the difference between GMO's and other production practices?	Investigate the germination rates of common seeds. Identify common methods of plant manipulation. Summarize the principles of recombinant the basic steps in the process of rDNA. Compare and contrast the potential risks and advantages associated with genetically modified plants. Evaluate the impact of using genetically modified crops on other production practices.	Biotechnology Practice, Conventional Practice, Crossbreeding, Genetic Engineering, Genetically Modified Organism, Gene Transfer, Genome, Germination, Hybridization, Organic Practice, Plant Manipulation, and Selective Breeding. Collaborate, Determine, Explain, Identify, and Interpret.	Evaluation Rubric: Battle of the Seeds Project Post-test: Germination Case Studies: Conventional versus Organic practices Evaluation Rubric: GMO or NO Project Written Assignment: Argumentative Essay	5 – 6 Weeks
Hydroponics and Aquaponics What are the differences between hydroponics and aquaponics? How are hydroponics and aquaponics similar?	Compare and contrast the types of systems used in hydroponic and aquaponics plant production. Identify advantages and disadvantages of plant production through hydroponics and aquaponics. Summarize the use of hydroponic and aquaponics systems for plant production.	Acidity, Algae, Alkalinity, Ammonia, Aquaponics, Biofilter, Decompose, Density, Germination, Hydroponics, Nitrate, Peat, pH, Phosphorus, Soluble, Synthetic, and Urea.	Evaluation Rubric: Growing Space – Hydroponics Project Evaluation Rubric: Community Supported Agriculture Project Post-test: Hydroponics & Aquaponics Systems	5 – 6 Weeks

What are advantages and disadvantages to using hydroponics and aquaponics?	Research, select, and defend the use of hydroponic and aquaponics plant systems.	Collaborate, Determine, Explain, Identify, and Interpret.		
<p>Greenhouse Management</p> <p>What are some of the requirements to maintain the greenhouse environment for successful growth of plants?</p> <p>What are the benefits of IPM?</p> <p>How can IPM be implemented into a greenhouse as a management technique?</p> <p>What are the tools and equipment required to implement IPM and other practices into the greenhouse?</p>	<p>Maintain plants (watering, pruning, fertilizing, repotting, insect, disease and weed control).</p> <p>Demonstrate knowledge and use of greenhouse environment requirements and their control.</p> <p>Demonstrate knowledge of disease, insect, pest and weed control that affect greenhouse crops.</p> <p>Compare and contrast benefits of modern IPM.</p> <p>Identify and describe the use of greenhouse tools and equipment, including the calibration of sprayers and spreaders.</p>	<p>Integrated Pest Management, Growth Regulator, Plugs, Pruning, Repotting, Retail, Seedlings, Thinning, Transplant, and Wholesale.</p> <p>Collaborate, Determine, Explain, Identify, and Interpret.</p>	<p>Written Assignment: Greenhouse Client</p> <p>Evaluation Rubric: Greenhouse Client Project</p> <p>Evaluation Rubric: Application of Plant Processes and Management Techniques</p> <p>Evaluation Rubric: Community Supported Agriculture Project</p> <p>Evaluation Rubric: Community Supported Agriculture Presentation</p>	5 – 6 Weeks

References (APA Format):

Agriculture, Food and Natural Resources (AFNR) Career Cluster Content Standards. (2015). Retrieved from <https://thecouncil.ffa.org/afnr/>

Curriculum for Agricultural Science and Education. (2021). Retrieved from <https://www.case4learning.org/>