



**SPRING GROVE AREA SCHOOL DISTRICT**



**PLANNED COURSE OVERVIEW**

<b>Course Title:</b> Introduction to Agriculture, Food, and Natural Resources <b>Grade Level(s):</b> 9-10 <b>Units of Credit:</b> 1 <b>Classification:</b> Core or Elective		<b>Length of Course:</b> Full Year <b>Periods Per Cycle:</b> 6 <b>Length of Period:</b> 40 Minutes <b>Total Instructional Time:</b> 120 Hours	
<b>Course Description</b>			
<p>Students will explore the many facets of agriculture, food, and natural resources. They will learn about the environment and natural resources, animal science, plant science, biotechnology, food science and processing, agricultural mechanics, and agricultural communications, business, and leadership.  <i>This course does qualify for Future Farmers of American (FFA) coursework.</i></p>			
<b>Instructional Strategies, Learning Practices, Activities, and Experiences</b>			
Class Discussion Debate Labs Field Activities	Concept Mapping Lab Notebook Setup Research Guest Speakers	Group Work Projects Demonstrations	
<b>Assessments</b>			
Quizzes and Test Projects	Lab Activities/Write Ups Presentations/Speeches	Designing/Construction Models	
<b>Materials/Resources</b>			
Handouts/Lab Notebooks	Laboratory Equipment	Technology	

**Adopted:** 5/22/23

**Revised:**

[https://springgroveareascho.sharepoint.com/sites/PrivateSGASD/Shared Documents/AASG/NEWCURR/SCIENCE/2023/HS Science Elective Courses/Introduction to Agriculture, Food, and Natural Resources/Intro to Ag Course\\_Overview.docx](https://springgroveareascho.sharepoint.com/sites/PrivateSGASD/Shared Documents/AASG/NEWCURR/SCIENCE/2023/HS Science Elective Courses/Introduction to Agriculture, Food, and Natural Resources/Intro to Ag Course_Overview.docx)

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Introduction to Agriculture, Food and Natural Resources</b></p> <ul style="list-style-type: none"> <li>• Define Agriculture</li> <li>• FFA</li> <li>• SAE (Supervised Agricultural Experience)</li> <li>• Agricultural Careers</li> </ul>	<p>MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.</p> <p>NRS.02.02. Assess the impact of human activities on the availability of natural resources.</p> <p>CRP.04. Communicate clearly, effectively and with reason.</p> <p>CRP.05. Consider the environmental, social, and economic impacts of decisions.</p> <p>CRP.06. Demonstrate creativity and innovation.</p> <p>CRP.10.01. Identify career opportunities within a career cluster that match personal interests, talents, goals, and preferences.</p> <p>CS.06.01. Examine and explain foundational cycles and systems of AFNR.</p>

<b>CONTENT/KEY CONCEPTS</b>	<b>OBJECTIVES/STANDARDS</b>
<p><b>Environment and Natural Resources</b></p> <ul style="list-style-type: none"> <li>• Abiotic/Biotic Features</li> <li>• Water and Water Management</li> <li>• Nutrient and Land Management</li> <li>• Alternative Energy</li> </ul>	<p>HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.</p> <p>HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p> <p>HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.</p> <p>MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.</p> <p>NRS.02.02. Assess the impact of human activities on the availability of natural resources.</p> <p>NRS.01.04.01.b. Assess the function of water-sheds and their effect on natural resources.</p> <p>NRS.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.</p> <p>NRS.03.01. Sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.).</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Plant Science</b></p> <ul style="list-style-type: none"> <li>• Plant vs. Animal Cells</li> <li>• Careers and Industry</li> <li>• Flower and Plant Parts</li> <li>• Photosynthesis</li> <li>• Greenhouse Management</li> <li>• Soil</li> </ul>	<p>HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.</p> <p>HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.</p> <p>HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.</p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p>MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p> <p>PS.02.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.</p> <p>PS.02.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.</p> <p>PS.02.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.</p>

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<p><b>Animal Science</b></p> <ul style="list-style-type: none"> <li>• Animal Terminology</li> <li>• Animal Industries</li> <li>• Animal Needs and Nutrition</li> <li>• Animal Behavior</li> </ul>	<p>MS-LS4-5. Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.</p> <p>MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.</p> <p>MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.</p> <p>AS.01. Analyze historic and current trends impacting the animal systems industry.</p> <p>AS.02. Utilize best-practice protocols based upon animal behaviors for animal husbandry and welfare.</p> <p>AS.03.01. Analyze the nutritional needs of animals.</p> <p>AS.05. Evaluate environmental factors affecting animal performance and implement procedures for enhancing performance and animal health.</p> <p>AS.06. Classify, evaluate, and select animals based on anatomical and physiological characteristics.</p>

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<p><b>Biotechnology and Genetics</b></p> <ul style="list-style-type: none"> <li>• Biotechnology Ethics</li> <li>• Natural vs Selective Breeding</li> <li>• GMOS</li> <li>• Agricultural Biotechnology Uses</li> </ul>	<p>HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.</p> <p>HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.</p> <p>HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.</p> <p>HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.</p> <p>MS-LS4-5. Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.</p> <p>BS.01.01. Investigate and explain the relationship between past, current and emerging applications of biotechnology in agriculture (e.g., major innovators, historical developments, potential applications of biotechnology, etc.).</p> <p>BS.01.03. Analyze the relationship and implications of bioethics, laws, and public perceptions on applications of biotechnology in agriculture (e.g., ethical, legal, social, cultural issues).</p> <p>BS.03.03. Apply biotechnology principles, techniques, and processes to protect the environment and maximize use of natural resources (e.g., biomass, bioprospecting, industrial biotechnology, etc.).</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Food Science and Processing</b></p> <ul style="list-style-type: none"> <li>• Local Food Systems</li> <li>• Food Mies, Security, and Waste</li> <li>• Industry and Careers</li> <li>• Food Safety</li> </ul>	<p>MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</p> <p>HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.</p> <p>HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.</p> <p>FPP.01. Develop and implement procedures to ensure safety, sanitation and quality in food products and processing facilities.</p> <p>FPP.03. Select and process food products for storage, distribution, and consumption.</p> <p>FPP.04. Explain the scope of the food industry and historical and current development of food products and processing.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Agricultural Mechanics</b></p> <ul style="list-style-type: none"> <li>• Agriculture Equipment and History</li> <li>• Agriculture Mechanics Project (Woodworking, Welding, Construction, Landscaping, Electrical, Small Gas Engines, Geospatial and Technology)</li> <li>• Careers and Industry</li> </ul>	<p>HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.</p> <p>HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.</p> <p>PST.02. Operate and maintain AFNR mechanical equipment and power systems.</p> <p>PST.03. Service and repair AFNR mechanical equipment and power systems.</p> <p>PST.04. Plan, build and maintain AFNR structures.</p> <p>PST.05. Use control, monitoring, geospatial and other technologies in AFNR power, structural and technical systems.</p>



CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Agricultural Communications, Business, and Leadership</b></p> <ul style="list-style-type: none"> <li>• Needs vs. Wants</li> <li>• Different Business Types</li> <li>• Business Plans</li> <li>• Ag Sales</li> </ul>	<p>HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.</p> <p>HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.</p> <p>ABS. 01. Apply Management planning principles in AFNR businesses.</p> <p>ABS. 04. Develop a business plan for an AFNR business.</p> <p>ABS. 05. Use sales and marketing principles to accomplish AFNR business objectives.</p>

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Community Agriculture</b></p> <ul style="list-style-type: none"> <li>• Local Industry</li> <li>• Local Career Opportunities</li> <li>• Community Needs</li> </ul>	<p>HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.</p> <p>CS.06.01. Examine and explain foundational cycles and systems of AFNR.</p> <p>CS.02.02. Examine the components of the AFNR systems and assess their impact on the local, state, national and global society, and economy</p>