Ag Science I

Agriculture

Grade(s) 9th, Duration 1 Year, 1 Credit
Elective Course

Course Overview

Scope And Sequence

Timeframe	Unit	Instructional Topics
11 Day(s)	Agriculture Everyday	1. Agriculture Everyday 2. Preparing for Your Future
12 Day(s)	Communicating Today	1. Listen to Me 2. Let's Get Together
14 Day(s)	The Science of Agriculture	1. Safety & Measurement 2. Agriscience Investigators
32 Day(s)	Natural Resources	1. From the Ground Up 2. The Whole Soil 3. Water World 4. Living in Harmony
50 Day(s)	Plants & Animals	1. Totally Cellular 2. All About Plants 3. Plant Needs 4. Animals in Ag 5. Animal Care 6. Edible Agriculture
34 Day(s)	Ag Power & Technology	1. Energy in Agriculture 2. This is My Land 3. How It's Made
8 Day(s)	Your Future in Agriscience	1. Looking Ahead

Course Details

Unit: Agriculture Everyday

Duration: 11 Day(s)

Unit Description

Agriculture and natural resources provide the basic needs, including food, clothing, and shelter, for human populations. Agriculture was the foundation for the shift from the nomadic lifestyle of a hunter-gatherer to settled, community-based societies.

Topic: Agriculture Everyday

Duration: 5 Day(s)

Topic Description (short)

Students learn what agriculture provides to the human population. Agriculture provides the most basic needs of human being: food, clothing, and shelter.

Learning Targets

1. Agriculture and natural resource system provide the three basic human needs of food, clothing, shelter.
2. Organization and record keeping are important to the success of an agricultural business.
3. Agriculture is a broad field of study that includes agriculture systems, natural resource management, science, business, communication, and leadership.
4. Production of agricultural commodities occurs within specific regions of the United States.

Formative Assessment

1. Determine if their basic needs are met after simulating the collection of resources during different situation.
2. Develop and keep an agriscience notebook to record and store information.
3. Interpret types of activities associated with agriculture from a case study about an ag. entrepreneur.
4. Research top commodities produced in the United States and determine the costs of food to consumers.

Topic: Preparing for Your Future

Duration: 6 Day(s)

Topic Description (short)

Students will learn how agricultural education will affect their specific needs: FFA, classroom, and career. They will engage in hands on activities about FFA opportunities, classroom expectations, and career opportunities in agriculture.

Learning Targets

1. Employability skills, such as work ethic, timeliness, communication, and self-direction, are essential attributes for a successful career.
2. Agriculture is a broad field that encompasses many employment areas and offers a wide array of career opportunities.

3. Supervised Agriculture Experiences (SAE) programs provide opportunities to explore potential career choices and develop professional career goals.
4. The National FFA Organization offers members many opportunities to build necessary employment and life skills, such as leadership, personal character, and career options.
5. Career Development Events (CDE) and Leadership Development Events expose students to opportunities in career exploration and leadership development.

Formative Assessment

1. Develop and maintain a career portfolio following a specific format.
2. Investigate the career opportunities available in agriculture, classify careers according to categories in ag, and evaluate personal interests related to career pathways.
3. Complete an Foundational Supervised Agriculture Experience.
4. Select FFA educational and personal growth opportunities meeting career interests.
5. Complete components of ten career development events and leadership development events.

Unit: Communicating Today

Duration: 12 Day(s)

Unit Description

Students will create a plan for a Supervised Agricultural Experience and learn to fill out a Missouri Ag Ed Record Book

Academic Vocabulary

SAE
Placement
Agribusiness
Entrepreneurship

Summative Assessment

SAE Plan
First Months record book

Materials and Resources (optional)

Missouri Ag Ed Record Book

Topic: Listen to Me

Duration: 6 Day(s)

Topic Description (short)

Students will learn about the importance of communication and soft skills in their life and future aspects.

Learning Targets

1. People utilize multiple forms of verbal and nonverbal communication.
2. Voice, presence, and expression are used in communicating effectively.
3. Speeches may be informative, persuasive, or special occasion.

Formative Assessment

1.Demonstrate verbal, and non-verbal forms of communication in a charades like game.
2. Present a formal introduction and practice effective public speaking characteristics.
3. Develop and present an informative speech.

Topic: Let's Get Together

Duration: 6 Day(s)

Topic Description (short)

Learning how to effectively work with teams.

Learning Targets

1. People use multiple forms of communication to communicate effectively as a team.
2. Parliamentary procedures are used to conduct orderly meetings.
3. Teamwork is essential when solving problems and completing group tasks.

Formative Assessment

1. Work collaboratively to complete team building challenges.
2. Use proper parliamentary procedures to voice an opinion.
3. Use group expectations and teamwork skills while working in a group.

Unit: The Science of Agriculture

Duration: 14 Day(s)

Unit Description

Students will understand proper equipment used, laboratory safety (shop & greenhouse), and how to measure.

Academic Vocabulary

Abrasion
Accident

Accuracy
Attitude
Caution
Danger
Data
Density
Distance
Electrocute
Emergency
Experiment
Extinguish
Fire extinguisher
Fire triangle
Fuel
Hazard
Heat
Mass
Observation
Oxygen
PPE
Procedure
Research
Safety
Safety color
Temperature
Volume
Warning

Topic: Safety & Measurement **Duration:** 6 Day(s)

Topic Description (short)
Students learn about the importance of industry safety and measurement protocols.

Learning Targets
1. Laboratory equipment has specific uses in scientific experiments.
2. Emergency equipment is essential in a laboratory and has specific uses.
3. Understanding and following procedures and rules are essential to maintaining a safe work environment.
4. Reading and understanding laboratory procedures are essential to conducting a laboratory experiment safely.
5. Mass, volume, temperature, and density are common laboratory measurements.

Formative Assessment
1. Identify and describe the uses of common laboratory equipment.
2. Locate and determine the purpose of emergency equipment and items located in the classroom, laboratory, and shop facilities.
3. Work with classmates to draft a list of ten safety rules.
4. Complete a laboratory exercise by following written procedures.
5. Measure distance, volume, mass, temperature, and density using the appropriate tools and scale.

Topic: Agriscience Investigators **Duration:** 8 Day(s)

Topic Description (short)
Understanding the importance of scientific practices in the agricultural industry.

Learning Targets
1. Classification is a basic skill used in daily life, scientific research, and the agricultural industry.
2. Proper and accurate data measurement and analysis is important for laboratory investigation.
3. The pH scale is 0-14 where 0 is extremely acidic, 7 is natural and 14 is extremely basic.
4. The scientific method is a systematic process used to solve a problem.

Formative Assessment
1. Classify objects on their physical characteristics.
2. Use vernier equipment and sensors to collect data for an experiment
3. Quantify the pH of a substance using Vernier equipment and a pH sensor.
4. Design an experiment that use a minimum of four science processes.

Unit: Natural Resources **Duration:** 32 Day(s)

Unit Description
Students will learn about the natural resources pathway and their contribution to their surroundings.

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Topic: From the Ground Up **Duration:** 4 Day(s)

Topic Description (short)
Students learn about the role soil and air play in the natural resource pathway.

Learning Targets
1. Mineral matter, air, water, and organic matter are found in different proportions within a soil and define soil quality.
2. Geographical features and environmental factors influence the formation process of soils and impact soil quality.
3. Soil erosion results in the loss of quality soil and is a concern in the study of mineral soils.

Formative Assessment
1. Evaluate particle size and organic matter in a soil sample.
2. Investigate organic matter's effect on soil porosity and soil air holding capacity.
3. Observe soil erosion caused by water.

Topic: The Whole Soil **Duration:** 7 Day(s)

Topic Description (short)
Students will learn about conservation practices and the importance of soil health in our agricultural industry.

Learning Targets
1. Soil is comprised of three different sized mineral particles: sand, silt, clay
2. Soil structure and soil texture are elements that affect soil function.
3. The pH of a soil is affected by its buffering capacity.
4. Soil horizons have varying structure, texture, and color.

Formative Assessment
1. Conduct tests to determine soil texture by feel.
2. Quantify soil permeability to understand the relationship between soil particle size and rate of water filtration
3. Design an experiment to test the buffering capacity of different soil textures.
4. Determine each horizon's texture, structure, and color within a soil profile.

Topic: Water World **Duration:** 11 Day(s)

Topic Description (short)
Students will develop a strong understanding of the water cycle and its effects on everyday agriculture.

Learning Targets
1. The water cycle is an example of a naturally occurring system in which the substance can change form and location.
2. Land topography influences the distribution of water and pollutants.
3. Water pollution comes from point and non-point sources.
4. Ecologists determine a water's quality by measuring temperature, pH, turbidity, dissolved oxygen, and total dissolved solids.

Formative Assessment
1. Play a game to simulate the journey of a drop water through the water cycle.
2. Model and observe the flow of water over a landform.
3. Determine the spread of pollution from point and non-point sources.
4. Evaluate water quality with sensors to quantify temperature, pH, turbidity, dissolved oxygen, and total dissolved solids.

Topic: Living in Harmony **Duration:** 9 Day(s)

Topic Description (short)
Students will learn about the importance of ecosystems.

Learning Targets
1. Energy flows from producers (plants) to consumers (animals).
2. Plants and animals depend on each other for survival.
3. Ecosystems are an interaction between organisms and the environment in which the organisms live.

Formative Assessment
1. Simulate the flow of energy in an ecosystem.
2. Observe the interdependence of plants and animals in a controlled environment.
3. Research an ecosystem and develop a model and poster depicting the ecosystem.

Unit: Plants & Animals **Duration:** 50 Day(s)

Unit Description
Students will dive into the world of plant and animals from a cellular to production level.

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Topic: Totally Cellular **Duration:** 8 Day(s)

Topic Description (short)

Students will differentiate between animal and plant cells. They will understand the importance of learning about animals and plants at a cellular level.

Learning Targets

1. Animal and plant cells have comparable and differing parts.
2. The nucleus of an animal and a plant cell is important for life-sustaining processes, such as cell division and protein synthesis.
3. Microscopes are tools for examining cells and cellular features.
4. DNA is genetic material found in animal and plant cell nuclei
5. Genes are a combination of DNA segments that define animal and plant physical appearance.
6. Offspring of animals and plants derive their genetic traits from both genetic parents.

Formative Assessment

1. Identify and label a cell's parts, including each organelles functions.
2. Describe the structure and function of a cell's nucleus.
3. Demonstrate the correct use of a microscope and prepare a slide to identify an onion cell's nucleus.
4. Extract the DNA bundles from strawberry tissue for observation.
5. Discover differences in the physical features of animals.
6. Link similarities in characteristics to trace dog traits.

Topic: All About Plants **Duration:** 8 Day(s)

Topic Description (short)

Students will be shown the importance and relevance of the plant science industry.

Learning Targets

1. Plants have roots, stems, leaves, and flowers, which are all vital to survival.
2. Seeds require moisture and warmth for germination.
3. Flowers, consisting of four main parts, produce seeds for reproduction.
4. Plants convert raw materials using the Sun's energy into sugar and oxygen.
5. Plant cells use water, oxygen, and glucose to produce energy and metabolic by-products of carbon dioxide and water.

Formative Assessment

1. Identify and sketch the four basic plant parts.
2. Conduct a germination trial to calculate the germination rate of bean seeds.
3. Construct a model depicting the parts of a complete flower.
4. Observe the presence of starch in plants that have received different light treatments.
5. Measure the respiration rate and its impact on the photosynthesis of plant leaves.

Topic: Plant Needs **Duration:** 8 Day(s)

Topic Description (short)

Students will understand the importance of plant nutrients and needs.

Learning Targets

1. Plants require adequate amounts of water for survival, growth, and development.
2. Environmental conditions influence plant production and management practices.
3. The three primary nutrients, nitrogen, phosphorous, and potassium, are necessary for the healthy growth of plants.
4. pH affects the health and well-being of plants.

Formative Assessment

1. Determine the relationship between water availability and turgor pressure.
2. Calculate growing degree units for two locations to determine crop maturity.
3. Research plant macronutrients and record the functions in plants and deficiency symptoms for each.
4. Research the effect of pH on plant health.

Topic: Animals in Ag **Duration:** 8 Day(s)

Topic Description (short)

Animal agriculture is prevalent in our community. This topic will focus on different species and how they provide food and fiber to our world.

Learning Targets

1. Animals are classified by gender, age, and reproductive ability.
2. Animals have a complex set of systems that must work together.
3. Body parts of animals vary among different species.
4. Animals are selected based on the quality and correctness of anatomical structure and productive potential.

Formative Assessment
1. Categorize animals by gender, age and reproductive ability.
2. Connect the internal body systems and their relationships using concept mapping software.
3. Create a review game of the external anatomy of an animal that will be used to teach others.
4. Compare objects to ideal criteria based on given priorities.

Topic: Animal Care **Duration:** 9 Day(s)

Topic Description (short)
Students will learn about the required nutrients, housing, and welfare of animals.

Learning Targets
1. Essential nutrients found in animal feed include protein, carbohydrates, fats, vitamins, minerals, and water.
2. Shelter helps animals control their body temperature.
3. Animals perceive potential dangers differently than humans.
4. Production and management of animals are based on anatomical and physiological characteristics.
5. Protein sources can create ethical dilemmas for producers and consumers.

Formative Assessment
1. Research the functions of six essential nutrients
2. Conduct an experiment to demonstrate the effect of insulation on maintaining body heat.
3. Draw conclusions on the perceptions of stimuli based on observations of optical illusions.
4. Match characteristics of various animals to specialized practices related to animals.
5. Form an opinion on animals and plant-based protein.

Topic: Edible Agriculture **Duration:** 7 Day(s)

Topic Description (short)
Food science pathway will be discussed. Students will learn about the food supply chain and how food gets from farm to table.

Learning Targets
1. Food is derived from animal and plant products.
2. Food must be produced, transported, processed and stored safely.
3. Food may be contaminated at many points while en-route to the consumer.

Formative Assessment
1. Document the plant and animal food products consumed in a twenty-four-hour period.
2. Examine microbial growth from cooked ground meat samples when refrigerated, stored at room temperature, and freshly cooked.
3. Observe and record the growth of bacterial cultures.

Unit: Ag Power & Technology **Duration:** 34 Day(s)

Unit Description
Students will learn about the agricultural mechanics pathway and the different components it encompasses.

Topic: Energy in Agriculture **Duration:** 9 Day(s)

Topic Description (short)
Differentiate between renewable and non-renewable energy sources in the agriculture industry, and how agriculture products can be made into energy sources.

Learning Targets
1. Renewable and non-renewable energy sources, such as wind, solar, and biofuels, are currently being used in the United States.
2. Agricultural commodities can be converted to alternative energy sources.
3. People depend on consumable forms of energy, such as fuel and electricity, which are used in everyday life.
4. The efficiency of energy and the amount of energy produced varies among sources.

Formative Assessment
1. Construct an educational display describing the relationship between agriculture and energy.
2. Measure electricity from various sources in a circuit.
3. Construct a solar energy system and compare the production of electricity under different light conditions.

Topic: This is My Land **Duration:** 9 Day(s)

Topic Description (short)
Land usage and topography is an important aspect in agriculture. Students will learn about global positioning systems and the laws that must be followed.

Learning Targets

1. All property is legally defined and recorded based on a standardized regulatory system.
2. Global Positioning System (GPS) is a method used to determine an exact location of a point on the earth using a coordinate system based on longitude and latitude readings.
3. Agriculturists use GPS and geographic information system to improve agricultural production efficiencies and environmental quality.
4. Federal, state, county and local laws govern land use.

Formative Assessment

1. Describe parcels of land using the rectangular survey system and the metes and bounds system.
2. Use three points to triangulate a location.
3. Collect soil data and record the GPS coordinates of each soil location.
4. Discuss zoning and land use issues and present a persuasive debate at a mock town hall meeting.

Topic: How It's Made **Duration:** 16 Day(s)

Topic Description (short)

Students will walk through the entire process of planning, billing, and building a project.

Learning Targets

1. English and metric linear measurement systems are two useful forms of measurement used every day.
2. The proper use of a scale is important when reading project plans.
3. Mechanical shop tools and materials have specific purposes.
4. Agricultural projects involve planning, design, construction, implementation, and evaluation.

Formative Assessment

1. Measure the length of objects using the English and metric system, and convert fraction inches to decimal inches.
2. Use proportions to solve problems and determine dimensions of objects drawn to scale.
3. Identify 20 different tools and use tools to build a project.
4. Write step-by-step directions and cost for a project.

Unit: Your Future in Agriscience

Duration: 8 Day(s)

Unit Description

Students will look at big world issues and use their knowledge gained throughout the course to brainstorm solutions.

Topic: Looking Ahead **Duration:** 8 Day(s)

Topic Description (short)

Students will use knowledge gained to express their understanding of agriculture's essential role in society.

Learning Targets

1. Agriculture plays an essential role in society and in feeding the world.
2. People develop goals to achieve their dreams.
3. Accurate record keeping is important to the success of an agricultural enterprise.

Formative Assessment

1. Write a brief outlining a plan to be proposed at a hearing solving world hunger.
2. Write a vision statement and develop personal goals.
3. Review work from the year and complete the Career Portfolio and record book.