CASE

Introduction to Agriculture, Food, and Natural Resources Detailed Course Outline

Unit 1 The Circles of Agricultural Education

Lesson 1.1 Agriculture Everyday

1. Agriculture and natural resource systems provide the three basic human needs of food, clothing, and shelter.
    - Determine if their basic needs are met after simulating the collection of resources during different situations. (Activity 1.1.1)
2. Organization and record keeping are important to the success of an agricultural business.
    - Develop and keep an Agriscience Notebook to record and store information. (Activity 1.1.2)
3. Agriculture is a broad field of study that includes agriculture systems, natural resource management, science, business, communication, and leadership.
    - Interpret types of activities associated with agriculture from a case study about an agricultural entrepreneur. (Activity 1.1.3)
4. Production of agricultural commodities occurs within specific regions of the United States.
    - Research top commodities produced in the United States and determine the costs of food to consumers. (Activity 1.1.4)

Lesson 1.2 Preparing for Your Future

1. Employability skills, such as work ethic, timeliness, communication, and self-direction, are essential attributes for a successful career.
    - Develop and maintain a career portfolio following a specific format. (Project 1.2.1)
2. Agriculture is a broad field that encompasses many employment areas and offers a wide array of career opportunities.
    - Investigate the career opportunities available in agriculture. (Activity 1.2.2)
    - Classify careers according to categories in agriculture. (Activity 1.2.2)
    - Evaluate personal interests related to career pathways. (Activity 1.2.2)
3. Supervised Agricultural Experiences (SAE) programs provide opportunities to explore potential career choices and develop professional career goals.
    - Complete a Foundational Supervised Agricultural Experience. (Activity 1.2.3)
4. The National FFA Organization offers members many opportunities to build necessary employment and life skills, such as leadership, personal character, and career options.
    - S Select FFA educational and personal growth opportunities meeting career interests. (Activity 1.2.4)
5. Career Development Events (CDE) and Leadership Development Events (LDE) expose students to opportunities in career exploration and leadership development.
    - Complete components of ten Career Development Events and Leadership Development Events. (Activity 1.2.5)

Unit 2 Communicating Today

Lesson 2.1 Listen to Me

1. People utilize multiple forms of verbal and nonverbal communication.
    - Demonstrate verbal and non-verbal forms of communication in a charades-like game. (Activity 2.1.1)
    - Identify and select appropriate attire for different activities. (Activity 2.1.2)
    - Prepare a formal introduction. (Activity 2.1.3)
2. Voice, presence, and expression are used in communicating effectively.
    - Present a formal introduction. (Activity 2.1.3)
    - Practice effective public speaking characteristics. (Activity 2.1.4)
3. Speeches may be informative, persuasive, or special occasion.
    - Develop and present an informative speech. (Activity 2.1.4)

Lesson 2.2 Let's Get Together

1. People utilize multiple forms of communication in their daily lives.
    - Work collaboratively to complete team building challenges. (Activity 2.2.2)
2. Parliamentary procedures are used to conduct orderly meetings.
    - Use proper parliamentary procedures to voice an opinion. (Activity 2.2.3)
    - Demonstrate the proper procedures for making a main motion and an amendment. (Activity 2.2.3)
3. Teamwork is essential when solving many problems and completing group tasks.
    - Use group expectations and teamwork skills while working in a group. (Activity 2.2.1)

Unit 3 The Science of Agriculture

Lesson 3.1 Safety and Measurement

1. Laboratory equipment has specific uses in scientific experiments.
    - Identify and describe the uses of common laboratory equipment. (Activity 3.1.1)
    - Collect data using laboratory equipment. (Activity 3.1.4)
2. Emergency equipment is essential in a laboratory and has specific uses..
    - Locate and determine the purpose of emergency equipment items located in the classroom, laboratory, and shop facilities. (Activity 3.1.2)
3. Understanding and following procedures and rules are essential to maintaining a safe work environment.
    - Work with classmates to draft a list of ten safety rules. (Activity 3.1.3)
4. Reading and understanding laboratory procedures are essential to conducting a laboratory experiment safely.
    - Complete a laboratory exercise by following written procedures. (Activity 3.1.4)
5. Mass, volume, temperature, and density are common laboratory measurements.
    - Measure distance, volume, mass, temperature, and density using the appropriate tools and scale. (Activity 3.1.4)

Lesson 3.2 Agriscience Investigators

1. Classification of people, places, and things is a basic skill used in daily life, scientific research, and the agricultural industry.

- Classify objects based on their physical characteristics. (Activity 3.2.1)
- Categorize animals using physical characteristics. (Activity 3.2.1)

2. Proper and accurate data measurement and analysis is important for laboratory investigation.
    - Use a Vernier equipment and sensors to collect data for an experiment. (Activity 3.2.2)
3. The pH scale is 0-14 where 0 is extremely acidic, 7 is neutral, and 14 is extremely basic.
    - Quantify the pH of a substance using Vernier equipment and a pH sensor. (Activity 3.2.3)
4. Scientific method is a systematic process used to solve a problem.
    - Design an experiment that uses a minimum of four science processes. (Project 3.2.4)
    - Use an experiment to demonstrate the scientific processes and laboratory safety. (Project 3.2.4)

Unit 4 Natural Resources

Lesson 4.1. Starting from the Ground Up

1. Mineral matter, air, water, and organic matter are found in different proportions within a soil and define soil quality.
    - Evaluate particle size and organic matter in a soil sample. (Activity 4.1.1)
2. Geographical features and environmental factors influence the formation process of soils and impact soil quality.
    - Investigate the effects organic matter has on soil porosity and soil air holding capacity. (Activity 4.1.2)
    - Observe how slope of the land causes water to erode away soil. (Activity 4.1.3)
3. Soil erosion results in the loss of quality soil and is a concern in the study of mineral soils.
    - Observe soil erosion caused by water. (Activity 4.1.3)

Lesson 4.2 The Whole Soil

1. Soil is comprised of three different sized mineral particles; sand, silt, and clay.
    - Conduct tests to determine soil texture by feel. (Activity 4.2.1)
2. Soil structure and soil texture are elements that affect soil function.
    - Quantify soil permeability to understand the relationship between soil particle size and rate of water filtration. (Activity 4.2.2)
3. The pH of a soil is affected by its buffering capacity.
    - Design an experiment to test the buffering capacity of different soil textures. (Project 4.2.3)
4. Soil horizons have varying structure, texture and color.
    - Determine each horizon's texture, structure, and color within a soil profile. (Activity 4.2.4)

Lesson 4.3 Water World

1. The water cycle is an example of a naturally occurring system in which the substance can change form and location.
    - Play a game to simulate the journey of a drop of water through the water cycle. (Project 4.3.1)
    - Write and illustrate a story about what they learned regarding the journey a drop of water takes through the water cycle. (Project 4.3.1)
2. Land topography influences the distribution of water and pollutants.
    - Model and observe the flow of water over a landform. (Activity 4.3.2)

3. Water pollution is caused by point and non-point sources.
    - Determine the spread of pollution from point and nonpoint sources. (Activity 4.3.3)
4. Ecologists determine a water's quality by measuring temperature, pH, turbidity, dissolved oxygen, and total dissolved solids (TDS).
    - Evaluate water quality with sensors to quantify temperature, pH, turbidity, dissolved oxygen, and total dissolved solids. (Activity 4.3.4)
    - Design an experiment determining drinking water quality. (Project 4.3.5)
    - Write a lab report explaining experimental findings. (Project 4.3.5)

Lesson 4.4 Living in Harmony

1. Energy flows from producers (plants) to consumers (animals).
    - Simulate the flow of energy in an ecosystem. (Activity 4.4.1)
2. Plants and animals depend on each other for survival.
    - Observe the interdependence of plants and animals in a controlled environment. (Activity 4.4.2)
3. Ecosystems are an interaction between organisms and the environment in which the organisms live.
    - Research an ecosystem. (Project 4.4.3)
    - Develop a model and poster depicting the ecosystem they studied. (Project 4.4.3)
    - Record key points of ecosystems presented by classmates. (Activity 4.4.4)

Unit 5 Plants and Animals

Lesson 5.1 Totally Cellular

1. Animal and plant cells have many similarities, especially in regards to cell function; however, there are important structural differences between the two cell types.
    - Identify and label a cell's parts, including each organelle's function. (Activity 5.1.1)
    - Determine structural differences between an animal and plant cell. (Activity 5.1.1)
2. The nucleus of an animal and a plant cell is important for several life sustaining processes, such as cell division and protein synthesis.
    - Describe the structure and function of a cell's nucleus. (Activity 5.1.1)
3. Microscopes are used to examine cells and cellular features.
    - Demonstrate the correct use of a microscope and prepare a slide to identify an onion cell's nucleus. (Activity 5.1.2)
4. DNA is genetic material that combined with protein comprises the chromosomes found inside animal and plant cell nuclei.
    - Extract the DNA bundles from strawberry tissue for observation. (Activity 5.1.3)
    - Construct a DNA model and demonstrate how DNA replication happens in a cell. (Activity 5.1.4)
5. Genes are a combination of DNA segments that define animal and plant physical appearance.
    - Discover differences in the physical features of animals. (Activity 5.1.5)
6. Offspring of animals and plants derive their genetic traits from both parents.
    - Link similarities in characteristics to trace dog traits. (Activity 5.1.5)

Lesson 5.2 All About Plants

1. Plants have roots, stems, leaves, and flowers, which are all vital to survival.
    - Identify and sketch the four basic plant parts. (Activity 5.2.1)

- Describe the functions of plant parts. (Activity 5.2.1)

2. Flowers, consisting of four main parts, produce seeds for reproduction.
    - Construct a model depicting the parts of a complete flower. (Project 5.2.2)
3. Seeds require moisture and warmth for germination.
    - Conduct a germination trial to determine the germination rate of bean seeds. (Activity 5.2.3)
4. Plants convert raw materials using the energy of the sun into sugar and oxygen.
    - Determine the presence of starch in plants that have received different light treatments. (Activity 5.2.4)
5. Plant cells use water, oxygen, and glucose to produce energy and metabolic by-products of carbon dioxide and water.
    - Collect data on the rate of respiration and photosynthesis of plant leaves. (Activity 5.2.5)

Lesson 5.3 Plant Needs

1. Plants require adequate amounts of water for survival, growth, and development.
    - Determine the relationship between water availability and turgor pressure. (Activity 5.3.1)
2. Environmental conditions influence plant production and management practices.
    - Calculate growing degree units for two locations to determine crop maturity. (Activity 5.3.2)
    - Investigate the optimal growth range for a plant using one environmental factor. (Project 5.3.5)
    - Write a lab report and develop a poster to report findings on environmental conditions and plant growth. (Project 5.3.5)
3. The three primary nutrients, nitrogen, phosphorus, and potassium, are necessary for the healthy growth of plants.
    - Research plant macronutrients and record the functions in plants and deficiency symptoms for each. (Activity 5.3.3)
4. pH affects the health and well-being of plants.
    - Research the effect of pH on plant health. (Activity 5.3.4)

Lesson 5.4 Animals in Ag

1. Animals are classified by gender, age, and reproductive ability.
    - Categorize animals by gender and species. (Activity 5.4.1)
2. Animals have a complex set of systems that must work together.
    - Connect the internal body systems and their relationships using concept mapping software. (Activity 5.4.2)
3. Body parts of animals vary among different species.
    - Create a review game of the external anatomy of an animal that will be used to teach others. (Project 5.4.3)
4. Animals are selected based on the quality and correctness of anatomical structure and productive potential.
    - Compare objects to ideal criteria based on given priorities. (Activity 5.4.4)
    - Evaluate a class of market hogs based on specific priorities. (Activity 5.4.4)

Lesson 5.5 Animal Care

1. Essential nutrients found in animal feed include protein, carbohydrates, fats, vitamins, minerals, and water.
    - Research the functions of six essential nutrients. (Activity 5.5.1)
    - Classify feedstuffs according to their nutrient value. (Activity 5.5.1)
2. Shelter helps animals control body temperature.
    - Conduct an experiment to demonstrate the effect of insulation on maintaining body heat. (Activity 5.5.2)
3. Animals perceive potential dangers differently than humans.
    - Draw conclusions on the perceptions of stimuli based on observations of optical illusions. (Activity 5.5.3)
4. Production and management of animals are based on anatomical and physiological characteristics.
    - Match characteristics of various animals to specialized practices related to animals. (Activity 5.5.4)
5. Protein sources can create ethical dilemmas for producers and consumers.
    - Form an opinion on animals and plant-based protein. (Problem 5.5.5)

Lesson 5.6 Edible Agriculture

1. Food is derived from animal and plant products.
    - Document the plant and animal food products consumed in a twenty-four-hour period. (Activity 5.6.1)
2. Food must be produced, transported, processed, and stored safely.
    - Examine microbial growth from cooked ground meat samples when refrigerated, stored at room temperature, and freshly cooked. (Activity 5.6.2)
    - Research the path a prepared food item takes through the food value chain and present their findings to the class. (Project 5.6.3)
3. Food may be contaminated at many points while in route to the consumer.
    - Observe and record growth of bacterial cultures. (Activity 5.6.2)
    - Solve a problem related to foodborne illness outbreak. (Problem 5.6.4)

Unit 6 Agricultural Power and Technology

Lesson 6.1 Energy in Agriculture

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.
    - Construct an educational display describing the relationship between agriculture and energy. (Project 6.1.1)
3. People depend on consumable forms of energy, such as fuel and electricity, which are used in everyday life.
    - Measure electricity from various sources in a circuit. (Activity 6.1.2)
    - Compare fuel consumption costs for agricultural production. (Activity 6.1.4)
4. The efficiency of energy and the amount of energy produced varies among sources.
    - Construct a solar energy system and compare the production of electricity under different light conditions. (Activity 6.1.3)
    - Compare the energy content of two common fuels used for energy production. (Activity 6.1.5)

Lesson 6.2 This is My Land

1. All property is legally defined and recorded based on a standardized regulatory system.
    - Describe parcels of land using the rectangular survey system and the metes and bounds system. (Activity 6.2.1)
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.
    - Use three points to triangulate a location. (Activity 6.2.2)
    - Determine latitude, longitude, and altitude using a GPS unit. (Activity 6.2.3)
3. Agriculturalists use Global Positioning System (GPS) and Geographic Information System (GIS) to improve agricultural production efficiencies and environmental quality.
    - Collect soil data and record the GPS coordinates of each soil location. (Activity 6.2.4)
    - Use the Web Soil Survey to research information on each soil location. (Activity 6.2.4)
4. Federal, state, county, and local laws govern how land can be used.
    - Discuss zoning and land use issues and present a persuasive debate at a mock town hall meeting. (Activity 6.2.5)

Lesson 6.3 How It's Made

1. English and metric linear measurement systems are two useful forms of measurement used every day.
    - Measure the length of objects using the English and metric system. objects. (Activity 6.3.1)
    - Convert fraction inches to decimal inches. (Activity 6.3.1)
2. The proper use of scale is important when drafting and designing project plans.
    - Use proportions to solve problems and determine dimensions of objects drawn to scale. (Activity 6.3.2)
    - Read three-view plans of three-dimensional birdhouses to match to bird criteria. (Activity 6.3.3)
3. Mechanical shop tools and materials have specific purposes.
    - Identify 20 different tools. (Activity 6.3.4)
    - Use tools to build a project. (Activity 6.3.4)
4. Agricultural projects involve planning, design, construction, implementation, and evaluation.
    - Write step-by-step directions and cost for a project. (Activity 6.3.5)
    - Develop complete project plans including researching, sketching, writing directions, and estimating a bill of materials. (Project 6.3.6)

Unit 7 Looking Ahead

Lesson 7.1 Your Future in Agriscience

1. Agriculture plays an essential role in society and feeding the world.
    - Write a brief outlining a plan to be proposed at a hearing on solving world hunger. (Problem 7.1.1)
    - Create a resume, cover letter, and job application for a specific agriculture career. (Project 7.1.3)
    - Deliver a narrative about a researched agricultural career. (Project 7.1.4)
2. People develop goals to achieve their dreams.
    - Write a vision statement and develop personal goals. (Activity 7.1.2)
3. Accurate record keeping is important to the success of an agricultural enterprise.

- Review work from the year and complete the Career Portfolio Portfolio. (Project 1.2.1)