**Animal and Plant Science**

Subject Code: 010125

Course & Unit Descriptions

**Course Description:**

Students will apply knowledge of animal and plant science to the agriculture industry. They will be introduced to the value of production animals relative to the agricultural marketplace. Students will engage in animal classification and selection, body systems, along with animal welfare and behavior in relation to the production of animals. Students will learn principles of plant anatomy and physiology, and the role of nutrition, deficiencies and growing environment on plant production. Throughout the course, business principles and professional skills will be examined.

**Unit: Careers in Animal and Plant Sciences**

Learners will examine the diverse and complex field of animal and plant sciences **and identify all phases of production, research, sales, service, business, and education that producers and scientists may be involved. Learners will identify and develop the communication and business leadership skills and knowledge needed in the career fields.**

Outcome 1.1.

Employability Skills: Develop career awareness and employability skills (e.g., face-to-face, online) needed for gaining and maintaining employment in diverse business settings.

Competency:

1.1.1. Identify the knowledge, skills and abilities necessary to succeed in careers.

1.1.2. Identify the scope of career opportunities and the requirements for education, training, certification, licensure and experience.

Outcome 1.2.

Leadership and Communications: Process, maintain, evaluate and disseminate information in a business. Develop leadership and team building to promote collaboration.

Competency:

1.2.1. Extract relevant, valid information from materials and cite sources of information.

1.2.2. Deliver formal and informal presentations.

1.2.3. Identify and use verbal, nonverbal and active listening skills to communicate effectively.

1.2.4. Use negotiation and conflict-resolution skills to reach solutions.

1.2.5. Communicate information (e.g., directions, ideas, vision, workplace expectations) for an intended audience and purpose.

1.2.6. Use proper grammar and expression in all aspects of communication.

1.2.7. Use problem-solving and consensus-building techniques to draw conclusions and determine next steps.

**Unit: Plants and Animals in Agriculture**

Learners will examine the diverse uses and practices that are used in the production of plants and animals.

Outcome 1.3.

Business Ethics and Law: Analyze how professional, ethical and legal behavior contributes to continuous improvement in organizational performance and regulatory compliance.

Competency:

1.3.1. Analyze how regulatory compliance (e.g., United States Department of Agriculture [USDA], Food and Drug Administration [FDA], United States Department of Interior [USDI], Ohio Livestock Care Standards, water quality standards, local water regulations, building codes) affects business operations and organizational performance.

Outcome 1.6.

Business Literacy: Develop foundational skills and knowledge in entrepreneurship, financial literacy and business operations.

Competency:

1.6.7. Identify the effect of supply and demand on products and services.

Outcome 1.11.

Principles of Business Economics: Examine and employ economic principles, concepts and policies to accomplish organizational goals and objectives.

Competency:

1.11.3. Use economic indicators to identify economic trends and conditions (e.g., inflation, interest rate fluctuations, unemployment rates).

1.11.4. Determine how the quality, quantity and pricing of goods and services are affected by domestic and international competition in a market economy.

1.11.8. Identify the relationships between economy, society and environment that lead to sustainability.

**Unit: Animal Classification**

In this unit, learners will investigate the form and function of the various parts of animals. Students will examine the various systems of the animals that enable them to survive and adapt to fit the various management systems.

Outcome 2.3.

Care and Management: Apply animal care and management procedures to ensure animal husbandry and welfare, including managing environmental conditions to ensure animal health and performance.

Competency:

2.3.1. Identify species-specific terminology based on gender and age.

2.3.2. Identify, classify, evaluate and select animal species or breeds for a desired outcome.

**Unit: Quality Assurance**

This unit will help a Student implement a quality assurance program. QA programs will help guide the student in selecting management practices that produce quality animal products in which the well-being of the animal is considered.

Outcome 2.3.

Care and Management: Apply animal care and management procedures to ensure animal husbandry and welfare, including managing environmental conditions to ensure animal health and performance.

Competency:

2.3.5. Perform species-specific animal identification techniques (e.g., chipping, tagging, branding, notching, tattooing).

2.3.9. Evaluate and perform animal care procedures throughout the life of the animal.

2.3.10. Monitor and evaluate the quality of an animal’s habitat and implement corrective methods as needed.

Outcome 2.5.

Animal Health: Implement preventive measures, treatment and maintenance options for species-specific diseases and disorders to improve an animal’s health and welfare.

Competency:

2.5.3. Recognize the preventative measures or treatments needed to maintain animal health.

2.5.4. Apply basic principles of first-aid.

**Unit: Animal Welfare**

Students will examine the differences in animal rights and animal welfare, along with organizations that promote each. They will integrate their Quality Assurance knowledge with how to properly care for animals.

Outcome 2.1.

Nutrition: Analyze, formulate, prepare and administer a ration for a population of specific animal species based on the economics, nutrition and availability of feed and evaluate the feed's effects on animals.

Competency:

2.1.2. Determine the role of nutrients and the nutritional requirements of different animal life processes and species.

2.1.3. Analyze the nutritional content and quality of feeds.

2.1.4. Identify and address major nutrient deficiency and toxicity symptoms.

Outcome 2.4.

Recognizing Diseases and Disorders: Evaluate animal conditions for species-specific diseases and disorders to assess an animal’s health and welfare.

Competency:

2.4.8. Explain the health risk of zoonotic diseases on humans and their historical significance and future implications.

Outcome 2.7.

Animal Behavior: Apply management practices to assure quality animal care, considering species-specific behaviors, human safety, social influences, public perception and regulations associated with animal welfare.

Competency:

2.7.1. Understand social influences, public perception and regulations that are associated with animal welfare.

2.7.2. Describe the adaptations and special senses (e.g., sight, hearing, smell, touch) of animals and how they contribute to animal behavior.

2.7.5. Interpret an animal’s intent based on its vocalization, body posture and chemical means of communication.

2.7.6. Recognize behavior abnormalities and employ corrective action.

**Unit: Animal Products Marketing & Selection**

In this unit, the learner will develop marketing and management strategies as well as examine various animal products.

Outcome 1.10.

Sales and Marketing: Manage pricing, place, promotion, packaging, positioning and public relations to improve quality customer service.

Competency:

1.10.1. Identify how the roles of sales, advertising and public relations contribute to a company’s brand.

1.10.2. Determine the customer's needs and identify solutions.

1.10.3. Communicate features, benefits and warranties of a product or service to the customer.

1.10.6. Discuss the importance of correct pricing to support a product’s or service’s positioning in the marketing mix.

1.10.8. Use promotional techniques to maximize sales revenues (e.g., advertising, sales promotions, publicity, public relations).

1.10.10. Demonstrate sales techniques.

Outcome 2.4.

Recognizing Diseases and Disorders: Evaluate animal conditions for species-specific diseases and disorders to assess an animal’s health and welfare.

Competency:

2.4.2. Examine an animal to evaluate its general condition.

Outcome 2.6.

Population Management: Manage reproduction practices in animal populations across habitats to achieve the desired outcomes and specific goals.

Competency:

2.6.2. Compare and select superior individuals based on phenotype.

2.6.3. Compare and select superior individuals based on breeding values and heritability of the desired traits.

Outcome 7.5.

Food Product Development: Apply principles of nutrition and human behavior to create a new food prototype that meets a specific dietary need or demand for consumption, design packaging and seek label approval.

Competency:

7.5.2. Identify consumer preferences, trends and opportunities affecting food product development.

**Unit: Body Systems**

In this unit, the learner will be able to differentiate the functions of body systems for agriculturally important animals.

Outcome 2.2.

Body Systems: Describe the interrelationships of animal body systems with growth, development, health, maintenance, reproduction and economic production.

Competency:

2.2.1. Describe external anatomical parts and their functions.

2.2.2. Identify the anatomical parts of the digestive system and describe their physiology.

2.2.12. Differentiate between the male and female reproductive system, structures and functions.

**Unit: Soil Science**

Students will be able to identify and classify soils based upon its composition, land capability uses, and implement soil conservation practices. Students will also be able to determine soils limitations in regards to rural, ecological, historical, and urban practices.

Outcome 6.1.

Soils: Apply knowledge of soil characteristics and soil information resources to overcome any existing soil use limitations while maintaining or improving soil quality.

Competency:

6.1.1. Identify soil forming factors and explain how they produce variability in soils.

6.1.2. Describe the relationship among physical properties of soils.

6.1.3. Collect, test and analyze soil samples for physical and chemical properties.

6.1.4. Identify factors (e.g., climate, vegetation, soil texture, drainage, management practices, landscape) affecting organic matter and its function in soil quality.

6.1.5. Determine land use and identify land capabilities classes.

6.1.6. Apply soil conservation practices to reduce soil erosion and compaction.

6.1.7. Compare and contrast the causes and effects of soil erosion.

**Unit: Anatomy and Physiology of Plants**

Students will identify plant anatomical structures and tissues along with their physiological functions. Students will also be able to identify the general characteristics of various plants and tissues.

Outcome 8.2.

Plant Reproduction: Propagate and cultivate plants for specific characteristics and economic variables for both greenhouses and crops.

Competency:

8.2.1. Identify the reproductive anatomy of plants and describe their physiological functions.

8.2.2. Describe how biotic and abiotic factors (e.g., insects, light, temperature, microorganisms, moisture, location) influence and optimize plant reproduction.

8.2.3. Compare and contrast variations of plant reproductive systems among plant species.

Outcome 8.4.

Growth and Management: Manage and manipulate plant development through the selection, planting and growing of seeds and plants, based on global demand, economic importance and growing conditions.

Competency:

8.4.2. Identify plant anatomical structures and tissues.

8.4.3. Identify and classify seeds and plants at all stages of growth.

8.4.6. Identify the principles of primary and secondary plant growth.

**Unit: Plant Taxonomy**

Students will be able to identify different plant species and their environmental requirements. Students will also identify and classify plants at different stages of growth.

Outcome 8.4.

Growth and Management: Manage and manipulate plant development through the selection, planting and growing of seeds and plants, based on global demand, economic importance and growing conditions.

Competency:

8.4.1. Identify and classify plants using taxonomy.

**Unit: Plant Nutrition and Deficiencies**

Students will identify the causes and symptoms of plant nutrient deficiencies. Students will be able to collect and analyze test data to calculate nutrient requirements and procedures for applying nutrients.

Outcome 8.1.

Plant Nutrition: Select and apply macronutrients and micronutrients based on deficiencies, identified using testing application methods and optimum management that account for environmental factors.

Competency:

8.1.1. Compare and contrast organic and inorganic sources of macronutrients and micronutrients.

8.1.2. Describe the functions of macronutrients and micronutrients in plants and the role that microorganisms play in plant nutrition.

8.1.3. Determine the nutrient requirements of plants.

8.1.4. Identify symptoms and causes of plant nutrient deficiencies and toxicities.

Outcome 8.3.

Pest Management: Develop and implement an integrated pest management (IPM) plan by scouting and identifying specific plant pests and the damage they cause and apply specialized control methods.

Competency:

8.3.1. Identify and classify insect, weed, disease and animal pests.

8.3.2. Examine the interrelationships among plants, pests, humans and the environment.

8.3.3. Analyze and calculate the economic threshold of pest damage.

**Unit: The Growing Environment**

Students will determine optimum management practices to control the growing environment and harvest products while monitoring the growth process.

Outcome 6.2.

Water Quality: Analyze, interpret and manage the biological, chemical and physical properties of water quality.

Competency:

6.2.1. Assess and explain the interactions between human activities and the Earth’s hydrosphere (e.g., septic systems, desalinization, point and non-point source pollution).

6.2.4. Explain the hydrological cycle (e.g., condensation, evaporation, transpiration) and how human and animal activity impacts the cycle.

6.2.5. Explain the biotic and abiotic factors affecting water quality.

6.2.7. Implement procedures and management practices that maintain or improve water quality.

Outcome 6.3.

Air Quality: Analyze, interpret and manage the biological, chemical and physical properties of air quality.

Competency:

6.3.5. Explain human and natural factors (e.g., volcanic eruptions, forest fires, greenhouse gases, farming practices, transportation) affecting air quality.

Outcome 6.4.

Water Use and Management: Collect, analyze and interpret data for a localized water use and management plan.

Competency:

6.4.1. Explain the domains of hydrology.

6.4.2. Describe the geological and meteorological principles affecting water supplies.

Outcome 8.4.

Growth and Management: Manage and manipulate plant development through the selection, planting and growing of seeds and plants, based on global demand, economic importance and growing conditions.

Competency:

8.4.4. Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis.

8.4.10. Select, evaluate and prepare soil or media for planting.

8.4.11. Understand and evaluate the process by which plants are selected.

8.4.12. Evaluate and implement planting practices (e.g., population rate, germination, seed vigor, inoculation, seed and plant treatments, type of planter, cuttings, pot in pot).

8.4.14. Control plant growth through mechanical and chemical means.

8.4.15. Analyze plant water requirements and provide water through artificial or natural means.

8.4.16. Explain the process and importance of transpiration in plant growth and development.

8.4.17. Recognize plant disease symptoms, prevention, avoidance and treatments.

Outcome 8.5.

Harvesting: Evaluate and implement harvesting methods to maximize yield.

Competency:

8.5.1. Identify characteristics of grains, seeds, vegetables, fruits and ornamental plants that indicate crop maturity.

8.5.5. Calculate potential yield and loss due to harvesting.

8.5.6. Evaluate the impact of harvest techniques on the quality of plants and plant products.

8.5.7. Identify harvesting methods and harvesting equipment.

**Unit: Supervised Agricultural Experiences and Record Keeping**

Students will use technology such as word processors, databases, spreadsheets, and electronic mail to maintain accurate business records. They will explore entrepreneurial ventures as well as research, placement and exploratory work-based learning options.

Outcome 1.1.

Employability Skills: Develop career awareness and employability skills (e.g., face-to-face, online) needed for gaining and maintaining employment in diverse business settings.

Competency:

1.1.3. Develop a career plan that reflects career interests, pathways and secondary and postsecondary options.

1.1.4. Describe the role and function of professional organizations, industry associations and organized labor and use networking techniques to develop and maintain professional relationships.

Outcome 1.6.

Business Literacy: Develop foundational skills and knowledge in entrepreneurship, financial literacy and business operations.

Competency:

1.6.1. Identify business opportunities.

1.6.2. Assess the reality of becoming an entrepreneur, including advantages and disadvantages (e.g., risk versus reward, reasons for success and failure).

1.6.3. Explain the importance of planning your business.

1.6.4. Identify types of businesses, ownership and entities (i.e., individual proprietorships, partnerships, corporations, cooperatives, public, private, profit, not-for-profit).

1.6.11. Describe how all business activities of an organization work within the parameters of a budget.

Outcome 1.4.

Knowledge Management and Information Technology: Demonstrate current and emerging strategies and technologies used to collect, analyze, record and share information in business operations.

Competency:

1.4.1. Use office equipment to communicate (e.g., phone, radio equipment, fax machine, scanner, public address systems).

1.4.2. Select and use software applications to locate, record, analyze and present information (e.g., word processing, e-mail, spreadsheet, databases, presentation, Internet search engines).

1.4.4. Use system hardware to support software applications.

1.4.5. Use information technology tools to maintain, secure and monitor business records.

1.4.6. Use an electronic database to access and create business and technical information.

Outcome 1.7.

Entrepreneurship/Entrepreneurs: Analyze the environment in which a business operates and the economic factors and opportunities associated with self-employment.

Competency:

1.7.7. Create a list of personal strengths, weaknesses, skills and abilities needed to be successful as an entrepreneur.

Outcome 1.8.

Operations Management: Plan, organize and monitor an organization or department to maximize contribution to organizational goals and objectives.

Competency:

1.8.1. Forecast future resources and budgetary needs using financial documents (e.g., balance sheet, demand forecasting, financial ratios).

1.8.2. Select and organize resources to develop a product or a service.

1.8.9. Develop a budget that reflects the strategies and goals of the organization.

Outcome 1.9.

Financial Management: Use financial tools, strategies and systems to develop, monitor and control the use of financial resources to ensure personal and business financial well-being.

Competency:

1.9.1. Create, analyze and interpret financial documents (e.g., budgets, income statements).

1.9.3. Review and summarize savings, investment strategies and purchasing options (e.g., cash, lease, finance, stocks, bonds).

1.9.8. Identify income sources and expenditures.

**Unit: FFA**

Students will demonstrate how FFA can make a positive influence in leadership skills. Students will lead group discussions, conduct business meetings using Robert’s Rules of Order as well as demonstrate the professionalism needed to foster positive working relationships. They will be introduced to the structure, history, and opportunities within the organization and how these serve as foundational career skills.

Outcome 1.1.

Employability Skills: Develop career awareness and employability skills (e.g., face-to-face, online) needed for gaining and maintaining employment in diverse business settings.

Competency:

1.1.4. Describe the role and function of professional organizations, industry associations and organized labor and use networking techniques to develop and maintain professional relationships.

Outcome 1.2.

Leadership and Communications: Process, maintain, evaluate and disseminate information in a business. Develop leadership and team building to promote collaboration.

Competency:

1.2.1. Extract relevant, valid information from materials and cite sources of information.

1.2.2. Deliver formal and informal presentations.

1.2.3. Identify and use verbal, nonverbal and active listening skills to communicate effectively.

1.2.5. Communicate information (e.g., directions, ideas, vision, workplace expectations) for an intended audience and purpose.

1.2.6. Use proper grammar and expression in all aspects of communication.

1.2.7. Use problem-solving and consensus-building techniques to draw conclusions and determine next steps.

1.2.13. Identify stakeholders and solicit their opinions.

1.2.14. Use motivational strategies to accomplish goals.