**Course Description:**

Students will learn and apply responsible animal management principles and routine husbandry practices. Topics will include nutrition, feeding, and caring for animals, body/carcass composition evaluation, and applying marketing principles to the sale and distribution of animal products. Learners will investigate animal genetics and how it impacts principles of animal improvement, selection and marketing. Throughout the course, learners will develop business leadership, problem-solving and communication skills in relation to the science of animals.

**Strand 1. Business Operations/21st Century Skills**

Learners apply principles of economics, business management, marketing and employability in an entrepreneur, manager and employee role to the leadership, planning, developing and analyzing of business enterprises related to the career field.

**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.

**Competencies**

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.

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

**Outcome: 1.2. Leadership and Communications**

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

**Competencies**

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.

1.2.8. Identify the strengths, weaknesses and characteristics of leadership styles that influence internal and external workplace relationships.

1.2.9. Identify advantages and disadvantages involving digital and/or electronic communications (e.g., common content for large audience, control of tone, speed, cost, lack of non-verbal cues, potential for forwarding information, longevity).

1.2.10. Use interpersonal skills to provide group leadership, promote collaboration and work in a team.

1.2.11. Write professional correspondence, documents, job applications and resumés.

1.2.12. Use technical writing skills to complete forms and create reports.

1.2.13. Identify stakeholders and solicit their opinions.

1.2.14. Use motivational strategies to accomplish goals.

**Outcome: 1.3. Business Ethics and Law**

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

**Competencies**

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.

1.3.2. Follow protocols and practices necessary to maintain a clean, safe and healthy work environment.

**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.

**Competencies**

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).

1.4.8. Use electronic media to communicate and follow network etiquette guidelines.

**Outcome: 1.6. Business Literacy**

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

**Competencies**

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

**Outcome: 1.10. Sales and Marketing**

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

**Competencies**

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.

**Outcome: 1.11. Principals of Business Economics**

Examine and employ economic principles, concepts and policies to accomplish organizational goals and objectives.

**Competencies**

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.

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 2. Animal Science**

Learners apply principles of animal anatomy, physiology, genetics, behavior and nutrition to the research and development, selection and reproduction, health and management of animals in domestic and natural environments.

**Outcome: 2.1. Nutrition**

Analyze, formulate, prepare and administer a ration for a population of specific animal species based on economic, nutrition and availability of feed and evaluate its effects on animals.

**Competencies**

2.1.1. Identify the traditional and alternative types, compositions, quality and compatibility of feeds, feed additives and feed byproducts.

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.

2.1.5. Identify and describe biological and non-biological contaminants found in feedstuffs and their

impacts on animals.

2.1.6. Determine feed efficiency and value in relation to the cost, quality and availability of feeds.

**Outcome: 2.2. Body Systems**

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

**Competencies**

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.

2.2.4. Identify the anatomical components of the skeletal system, including the types and forms of bones, and describe their physiology.

2.2.5. Identify the anatomy of the musculature systems, including striated, cardiac and smooth muscle, and describe their physiology.

2.2.6. Compare and contrast bone growth, muscle growth, and fat deposition in relation to developmental patterns.

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

2.2.13. Describe the endocrine system, its structures and the role of hormones.

2.2.15. Identify the anatomy and describe the physiology of the mammary system.

**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.

**Competencies**

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.

2.3.3. Determine the biotic and abiotic factors (e.g., air, ventilation) that impact the animals’ environment.

2.3.4. Apply concepts of pest control, sanitation and disinfection procedures for the animals’ care and management.

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

2.3.6. Use identification techniques for record keeping and traceability.

2.3.7. Estimate an operation’s or environment's carrying capacity and its impact on animal health.

2.3.8. Identify and recognize predator-prey relationships and implement control measures.

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: 2.4. Recognizing Diseases and Disorders**

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

**Competencies**

2.4.2. Examine an animal to evaluate its general condition.

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

**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.

**Competencies**

2.5.4. Apply basic principles of first-aid.

2.5.6. Describe the routes of administration for medications and the process of drug absorption, distribution, metabolism, withdrawal and excretion.

2.5.7. Interpret and follow label directions for the dosage, route of administration and withdrawal period.

**Outcome: 2.6. Population Management**

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

**Competencies**

2.6.1. Identify factors that lead to reproductive maturity and select animals for reproductive readiness.

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.

2.6.4. Determine the factors that influence estrus, gestation and parturition and employ appropriate

management practices.

2.6.5. Manipulate an animal’s reproductive processes to support breeding (e.g., sex-sorted semen, heat synchronization, nutritional flushing, light cycling).

2.6.6. Evaluate and employ breeding methods (e.g., artificial insemination, embryo transfer, natural

selection, selective breeding, invitro fertilization, cloning).

2.6.7. Describe nutritional and environmental influences during different stages of gestation.

2.6.8. Describe ethical and responsible animal population management practices (e.g., spaying, neutering, birth control, relocation, reintroduction, hunting, containment, culling).

**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.

**Competencies**

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.

2.7.3. Identify and describe the innate behavioral patterns of animals.

2.7.4. Identify social relationships involved in behavioral adjustment and adaptation (e.g., animal-to-animal and human-to-animal interaction).

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.

2.7.7. Handle, restrain and move animals, while ensuring the safety of the animals and their handlers.

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 3. Biotechnology**

Learners apply the skills and knowledge of interpreting laboratory requests, using protective clothing and hazardous material containment, specimen collection procedures, a variety of laboratory testing and techniques, and maintenance of laboratory equipment and supplies.

**Outcome: 3.4. Molecular-Genetics Technology**

Apply knowledge of nucleic acid structure and function, deoxyribonucleic acid (DNA) replication, transcription, translation, chromosome structure and remodeling and regulation of gene expression in prokaryotes and eukaryotes.

**Competencies**

3.4.1. Use a Punnet square to predict and explain Mendel’s Laws, genotype and phenotype.

3.4.4. Model the Central Dogma Theory (e.g., replication, transcription, translation).

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 4. Power Systems**

Learners apply principles of tool use, power transmission, hydraulics, two- and four-stroke cycle combustion, heating and cooling, exhaust, ignition, starting and charging, steering and lubrication systems to operate, to maintain or repair equipment.

**Outcome: 4.1. Tool, Stationary and Mobile Equipment Maintenance**

Inspect, clean, maintain and perform planned preventative maintenance on tools, machinery, implements and equipment.

**Competencies**

4.1.1. Identify the types of hand tools, power tools and stationary equipment and describe their functions.

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 6. Environmental Science**

Learners apply earth, life, and physical sciences to the production, extraction, processing, protection, use, and renewal of both renewable and non-renewable resources.

**Outcome: 6.7. Solid Waste and Renewable Resource Management**

Control and process solid waste using current and alternative technologies.

**Competencies**

6.7.6. Describe and implement solid waste management methods (e.g., composting, incineration, recycling, burial).

6.7.7. Explain the control processes and potential uses for solid waste byproducts (e.g., leachate, ash, landfill gas, sludge, methane, manure).

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 7. Food Science**

Learners apply principles of biology, chemistry and physics to the research, development, production, processing and distribution of food products meeting quality assurance standards in a system that is safe and secure.

**Outcome: 7.1. The Science of Food**

Differentiate the structures, functions and sources of basic functional ingredients and the roles they play in the development and manufacturing of food products for human nutrition.

**Competencies**

7.1.6. Relate the functions and physical properties of simple and complex carbohydrates, lipids, vitamins, minerals and proteins (i.e., functional ingredients) to the manufacturing of food products.

**Outcome: 7.3. Meat Science**

Perform safe and sanitary harvest techniques and determine meat quality.

**Competencies**

7.3.2. Perform humane harvesting techniques, including stunning, shackling and bleeding.

7.3.10. Fabricate carcasses into species-specific wholesale and retail cuts.

**Outcome: 7.4. Food Production and Processing**

Process a food product for distribution and consumption.

**Competencies**

7.4.7. Process raw materials and products and apply food grading systems and standards of identity.

7.4.9. Determine the environmental impact of processing a food product.

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 8. Plant Science**

Learners apply principles of plant anatomy, physiology, nutrition and genetics to the research and development, selection and reproduction, planting, fertilization, health, harvesting and management of plants in a domestic and/or natural environment.

**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.

**Competencies**

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

*An “X” indicates that the pathway applies to the outcome~~.~~*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Strand 9. Energy**

Learners apply principles of physics, chemistry, the earth sciences and mathematics to energy sources, transformations, acquisition, and application.

**Outcome: 9.1. Energy**

Identify energy sources according to their economic viability, sustainability and environmental impact.

**Competencies**

9.1.7. Determine best management practices (e.g., carbon sequestration, conservation, animal safety, efficiency) that lessen environmental impact.

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** |  | Agribusiness and Production Systems | X | Animal Science and Management |  | Bioscience | | |  | Horticulture |
|  | Natural Resource Management |  | Power Technology | | |  |  | | |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |