**Course Description:**

Students will apply food chemistry and microbiology to processing, preservation, packaging, storage and marketing of meat products. Students will design and implement a quality assurance program that meets legal compliance and demonstrates knowledge of safe operation and maintenance of equipment and facilities. Students will evaluate carcass composition, assign quality grades, and examine valued-added products. Throughout the course, students will demonstrate customer service and sales techniques while understanding the scope and importance of business and safety regulations.

**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: 1.2. Leadership and Communications**

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

**Competencies**

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

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

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.

1.3.3. Use ethical character traits consistent with workplace standards (e.g., honesty, personal integrity, compassion, justice).

1.3.4. Identify how federal and state consumer protection laws affect products and services.

1.3.5. Access and implement safety compliance measures (e.g., quality assurance information, safety data sheets [SDSs], product safety data sheets [PSDSs], United States Environmental Protection Agency [EPA], United States Occupational Safety and Health Administration [OSHA]) that contribute to the continuous improvement of the organization.

1.3.7. Identify the labor laws that affect employment and the consequences of noncompliance for both employee and employer (e.g., harassment, labor, employment, employment interview, testing, minor labor laws, Americans with Disabilities Act, Fair Labor Standards Acts, Equal Employment Opportunity Commission [EEOC]).

1.3.9. Identify potential conflicts of interest (e.g., personal gain, project bidding) between personal, organizational and professional ethical standards.

**Outcome: 1.6. Business Literacy**

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

**Competencies**

1.6.6. Identify the target market served by the organization, the niche that the organization fills and an outlook of the industry.

1.6.8. Identify the features and benefits that make an organization’s product or service competitive.

**Outcome: 1.8. Operations Management**

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

**Competencies**

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

1.8.5. Use inventory and control systems to purchase materials, supplies and equipment (e.g., Last In, First Out [LIFO]; First In, First Out [FIFO]; Just in Time [JIT]; LEAN).

**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.

**Competencies**

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

1.9.8. Identify income sources and expenditures.

**Outcome: 1.10. Sales and Marketing**

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

**Competencies**

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.

1.10.5. Monitor customer expectations and determine product/service satisfaction by using measurement tools.

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

marketing mix.

1.10.7. Describe the importance and diversity of distribution channels (i.e., direct, indirect) to sell a product.

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: 1.12. Site and Personal Safety Procedures**

Follow site and personal safety procedures in specific situations with specialized tools and equipment, evaluate the situation and take corrective action.

**Competencies**

1.12.1. Use Occupational Safety and Health Administration (OSHA) defined procedures for identifying

employer and employee responsibilities, working in confined spaces, managing worker safety

programs, using ground fault circuit interrupters (GFCIs), maintaining clearance and boundaries and labeling.

1.12.2. Interpret safety signs and symbols.

1.12.6. Identify procedures for the handling, storage and disposal of hazardous materials.

1.12.7. Select, use, store, maintain and dispose of personal protective equipment (PPE), appropriate to job tasks, conditions and materials.

1.12.8. Identify safety hazards and take corrective measures.

1.12.9. Identify, inspect and use safety equipment appropriate for the task.

1.12.10. Follow established procedures for the administration of first aid and contact emergency medical personnel when necessary.

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

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| **Pathways** |  | Agribusiness and Production Systems |  | Animal Science and Management | X | 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.

4.1.2. Ensure the presence and functionality of safety systems and hardware.

4.1.4. Maintain machinery, equipment, instrument and facility cleanliness, appearance and safety.

4.1.7. Clean, lubricate and adjust machinery and equipment.

**Outcome: 4.2. Equipment Operations**

Operate and maintain mechanical equipment and power systems.

**Competencies**

4.2.1. Follow manufacturer’s recommended operating procedures and adjustment specifications.

4.2.2. Differentiate among the functions, limitations and proper use of equipment, equipment controls and instrumentation.

4.2.3. Perform pre- and post-operation inspections and adjustments and report malfunctions.

4.2.4. Perform appropriate start-up, operating and shut-down procedures.

4.2.5. Select and operate the equipment and attachments needed to complete the task including levers, pedals or valves.

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

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| **Pathways** |  | Agribusiness and Production Systems |  | Animal Science and Management | X | 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**

6.7.1. Collect, analyze and treat solid waste materials (e.g., mortalities, manure, garbage).

6.7.3. Determine an acceptable site for solid waste disposal.

6.7.5. Describe and monitor solid waste disposal procedures (e.g., landfill, compost).

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

6.7.10. Determine type and volume of solid waste generated by an operation or facility.

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

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| **Pathways** |  | Agribusiness and Production Systems |  | Animal Science and Management | X | 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**

7.1.2. Distinguish the sources and forms of energy, the relationship between heat and temperature, how heat is transferred and the factors that affect the rates of reaction in food processing.

7.1.3. Measure the acidity, alkalinity and molarity of food products and describe the role of pH in food processing and storage.

7.1.4. Assess water’s function in food processing, distinguish between moisture content and water activity and differentiate how water activity affects food functionality and storage.

7.1.5. Describe the composition, structure and sources of sugars, complex carbohydrates, lipids, vitamins, minerals and proteins (i.e., functional ingredients) and their nutritional contributions to dietary needs.

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.

7.1.7. Describe the roles of enzymes as catalysts and the factors that affect enzyme activity.

7.1.8. Differentiate the metabolic processes and the factors that affect metabolic changes in the human body (i.e., anabolism, catabolism, basal metabolism).

**Outcome: 7.3. Meat Science**

Perform safe and sanitary harvest techniques and determine meat quality.

**Competencies**

7.3.1. Describe the benefits of an antemortem inspection, in relation to food safety.

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

7.3.3. Remove and inspect offal postmortem for signs of disease or contamination.

7.3.4. Prepare a carcass for chilling and inspection through species-specific techniques (e.g., splitting, washing, weighing).

7.3.5. Describe the role of post mortem metabolism in converting muscle to meat.

7.3.6. Differentiate the degrees of marbling and describe its role in the quality grading of meat.

7.3.7. Calculate the maturity of an animal using skeletal ossification and lean maturity ratings.

7.3.8. Issue yield grades using the amount of boneless, closely trimmed retail cuts from the high-value parts of the carcass.

7.3.9. Calculate carcass value using a grid-based marketing system.

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**

7.4.1. Describe the process used in thermal and non-thermal preservation, control the variables and apply processing methods (e.g., retorting, high pressure, ultra-high temperature [UHT], high temperature short time [HTST], chilling, freezing).

7.4.2. Describe the process of dehydration and concentration, control the variables that affect the quality of dried foods and apply the methods.

7.4.3. Describe the functions and types of packaging operations, equipment and materials and use them to manufacture food products (e.g., metal, glass, paper, plastic, film, laminates, edible coatings).

7.4.4. Compare and contrast reduced oxygen packaging (ROP) processes (e.g., controlled and modified atmosphere packaging, desiccants) and use them to manufacture food products.

7.4.5. Process food through mixing, grinding, pumping and washing and describe the physical change in the food product.

7.4.6. Identify the characteristics and properties of mixtures (e.g., solutions, colloidal dispersions and

suspensions) and select and apply appropriate chemical or biological separation techniques.

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

7.4.8. Compare and contrast storage and distribution methods for shelf-stable and non-shelf-stable products.

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

7.4.10. Differentiate among beneficial microorganisms (e.g., bacteria, mold, yeast) and their uses in food production.

7.4.11. Process food products through biological processing (e.g., fermenting, enzymes, microbes).

7.4.12. Manage processes for handling the solid and liquid waste from manufacturing food products.

**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.

**Competencies**

7.5.8. Create new uses for low value components of the food generation process.

**Outcome: 7.6. Food Safety and Sanitation**

Develop a food safety and sanitation plan, addressing processing facility needs and contamination points.

**Competencies**

7.6.1. Identify, isolate, and monitor food product allergens.

7.6.2. Establish and implement procedures for preoperational inspection and cleaning.

7.6.3. Identify the sources and types of food-borne illness and pathogens and prevent their entrance into the food supply.

7.6.4. Develop and implement a pest control system.

7.6.5. Conduct a good manufacturing practice (GMP) audit, review the findings and implement corrective actions.

7.6.6. Identify and monitor hazards and critical control points and apply hazard analysis and critical control point (HAACP) corrective action procedures.

7.6.7. Determine critical safety parameters using government regulations for handling and storage.

7.6.8. Identify the key activities (e.g., recall exercise, regulatory notification) of a recall program.

7.6.9. Identify the government agencies involved in the production and regulation of food products.

**Outcome: 7.7. Biosecurity**

Connect the sources and causes of contamination and develop the protocols to implement bio-security procedures.

**Competencies**

7.7.1. Investigate sources and origins of agents that can contaminate processed and unprocessed food products.

7.7.2. Identify activities and biological agents that contribute to the risk of acquiring or preventing a specific disease.

7.7.3. Identify sources of biological and chemical tampering points.

7.7.4. Assess a facility's biosecurity, classify the level of risk and recommend improvements.

7.7.5. Implement biosecurity procedures to prevent cross-site contamination (e.g., proper use and disposal of personal protective equipment [PPE] from site to site, vehicle cleaning between farm and processing site).

7.7.6. Screen and test animals and plant products for infectious agents or contamination.

7.7.7. Select bio-containment practices (e.g., quarantine, eradicate, showering into facilities) to manage pests and diseases.

7.7.8. Manage biosecurity of raw materials and finished product during transportation (e.g., security seals, chain of custody).

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

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