**Agriculture, Food and Natural Resources**

Subject Code: 010105

Course & Unit Descriptions

**Course Description:**

This first course in the career field is an introduction to Agricultural and Environmental Systems. Students will be introduced to the scope of the Agricultural and Environmental Systems career field. They will examine principles of food science, natural resource management, animal science & management, plant & horticultural science, power technology and bioscience. Students will examine the FFA organization and Supervised Agricultural Experience programs. Throughout the course, students will develop communication, leadership and business skills essential to the agriculture industry.

**Unit: Production Agriculture & Agribusiness**

Students will be introduced to the vast operations and opportunities within the Food, Fiber and Natural Resources Industries. They will explore general agricultural topics such as top grossing commodities, career opportunities within the agribusiness field as well as terminology essential to the understanding of the agricultural world.

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 1.8.

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

Competency:

1.8.3. Analyze the performance of organizational activities and reallocate resources to achieve established goals.

Outcome 1.11.

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

Competency:

1.11.1. Identify the economic principles that guide geographic location of an industry's facilities (e.g., relative scarcity, price, quantity of products and services).

**Unit: Sustainable Agriculture**

This unit asks the question, what is sustainable agriculture? Students will learn which basic practices will allow the sustainability of life through one’s own efforts in producing agricultural products in various climates and atmospheres.

Outcome 1.8.

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

Competency:

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 1.11.

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

Competency:

1.11.1. Identify the economic principles that guide geographic location of an industry's facilities (e.g., relative scarcity, price, quantity of products and services).

Outcome 9.1.

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

Competency:

9.1.2. Identify, compare and contrast renewable energy sources and the technology used to generate energy.

9.1.4. Identify the social, economic and environmental drivers and barriers that influence the development and use of energy sources.

**Unit: Industrial Technology & Safety**

Students will explore engineering and structural principles utilized in the agriculture industry and the coordinating career opportunities. Topics could include an overview of estimating and building, fundamental principles of metal working and engine repair. Safety will be an essential underlying theme in all fields explored.

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 1.12.

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.

Competency:

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.

1.12.5. Identify the location of emergency flush showers, eyewash fountains, Safety Data Sheets (sdss), fire alarms and exits.

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.

Outcome 4.1.

Tool, Stationary and Mobile Equipment Maintenance: Inspect, clean, maintain and perform planned preventative maintenance on tools, machinery, implements and equipment.

Competency:

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

Outcome 4.3.

Engines: Apply concepts to service components of both small and large internal combustion engines.

Competency:

4.3.5. Compare and contrast two-cycle and four-cycle engines and their operating principles.

Outcome 5.3.

Design and Estimate: Plan and design a basic site plan for a desired outcome.

Competency:

5.3.1. Identify, interpret and use symbols, lines, dimensions, views, sections, site plans, floor plans, specifications, common scales, detail drawings and abbreviations on drawings and prints.

5.3.2. Apply proportional reasoning and indirect measurement techniques.

Outcome 5.6.

Construction: Follow architectural plans to construct and repair simple outdoor structures and minor building additions.

Competency:

5.6.2. Lay out, cut, smooth, shape and bore construction materials.

Outcome 5.10.

Joining and Cutting Metals with Heat: Join and cut steel using heat in horizontal and vertical positions.

Competency:

5.10.3. Compare and contrast metal welding operating characteristics and performance (e.g., oxy-fuel, shielded metal arc, gas tungsten arc, braising, soldering).

**Unit: Biotechnology**

Learners will explore introductory principles in biotechnology, including microbiology and genetics to plant and animal research and product development. Students will apply genetic principles to determine genotypes and phenotypes and discover the career opportunities within these industries.

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 3.1.

Handling, Preparation, Transportation, Storage and Disposal: Handle, prepare, transport, store and dispose of specimens using procedures that minimize disturbance to the test specimen. Monitor, record and maintain the integrity of equipment and instrumentation, environmental conditions of the facility and the inventory.

Competency:

3.1.7. Select personal protective attire for various laboratory protocols.

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.

Competency:

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

Outcome 3.6.

Culturing: Perform experimental techniques used in microbial biology to study cell growth, manipulation and evaluation.

Competency:

3.6.1. Identify the structure of cells and the functions of their components.

**Unit: Food Science**

Students will be exposed to careers in the research, marketing, processing and packaging techniques applied to the development of food products. Learners will be introduced to nutrient content in the development of food products.

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 7.2.

Quality Assurance: Inspect the food production process, locate potential sources of food quality and safety deviations in facilities and prepare a corrective action plan.

Competency:

7.2.2. Describe the internal and external quality attributes that a food product should possess.

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:

7.5.1. Conduct a sensory evaluation of food products.

7.5.4. Calculate nutrient values, serving sizes and nutrient variability for a food product.

**Unit: Animal Science**

Students will be introduced to the five main areas of animals: production, exotic, companion, wildlife and research. They will examine career opportunities in both the small and large animal sectors as well as learn basic terminology to understand the similarities and differences of each.

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 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: Plant and Horticulture Science**

Students will be introduced to the main areas of the green industry (e.g. floral, turf grass, crop production, greenhouse management). They will examine career opportunities in both the research and production sectors as well as learn basic terminology to understand the similarities and differences of each.

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 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:

8.1.3. Determine the nutrient requirements of plants.

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.

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

**Unit: Natural Resources**

Students will be introduced to the various career opportunities in the natural resources areas, including forestry and wildlife, natural resource and energy management and water quality control. They will be exposed to the relationships between organisms and their environment.

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 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.

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

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).

Outcome 6.11.

Habitat Management and Restoration: Develop a plan for the management and restoration of a specific habitat.

Competency:

6.11.1. Differentiate the properties and characteristics of habitats.

6.11.2. Examine sites and place them into ecological classifications.

6.11.3. Explain the impacts of an increasing human population on habitats.

Outcome 9.1.

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

Competency:

9.1.1. Identify, compare and contrast fossil fuel sources and the technology used to generate energy.

9.1.2. Identify, compare and contrast renewable energy sources and the technology used to generate energy.

9.1.3. Identify, compare and contrast alternative energy sources and technology used to generate energy (e.g., fuel cells, hydrogen, nuclear).

9.1.4. Identify the social, economic and environmental drivers and barriers that influence the development and use of energy sources.

**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:

1.6.2. 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:

1.8.2. 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.

1.2.5. 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.