**Wildlife and Fisheries**

Subject Code: 010745

Course & Unit Descriptions

**Course Description:**

Learners will apply the principles and practices of resource conservation and management to fish and wildlife populations. Students will learn proper wild animal handling techniques, principles of wildlife nutrition, inventory practices, water quality parameters and testing, and natural and artificial propagation. Learners will apply principles of facility design and layout for managing fish populations. Throughout the course, learners will research and evaluate the impacts of various land practices, legislation, and human activities on habitats and populations.

**Unit: Safety**

Students will use the tools and equipment needed for fish and wildlife safely while following posted guidelines.

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.

**Unit: Equipment Operation and Maintenance**

Students will perform basic maintenance on stationary and mobile power equipment. Students will demonstrate how to operate the machinery safely according to industry standards.

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.

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

4.1.3 Identify potential hazards and limitations related to the use of hand tools, power tools and stationary equipment.

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

4.1.5 Inspect and service the electrical connections and lamps.

4.1.6 Inspect for fluid leakage, fluid levels and the condition of fluids.

4.1.7 Clean, lubricate and adjust machinery and equipment.

4.1.8 Select fluids, maintain fluid levels and replace system filters.

4.1.9 Inspect and maintain fluid conveyance and storage components (e.g., hoses and lines, valves, nozzles).

4.1.10 Inspect and replace drive belts.

4.1.11 Calibrate metering, monitoring and sensing equipment.

Outcome 4.2

Equipment Operations: Operate and maintain mechanical equipment and power systems.

Competency:

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.

**Unit: Mammal Identification**

Students will identify, classify, and select mammals using breed and/or specie characteristics. Students will identify and care for habitats and ecosystems.

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.

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.

**Unit: Waterfowl and Game Bird Identification**

Using industry standards, students will identify and describe the care and management of waterfowl and game birds. Students will monitor and care for habitats and ecosystems.

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.

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.

**Unit: Fish Identification**

Using industry standards, students will identify fish and aquatic animals. Learners will identify and care for fish and aquatic habitats.

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.

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.

**Unit: Plant Identification - food and cover**

Students will identify and demonstrate knowledge of the materials needed for the production and management 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.

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

**Unit: Habitat Assessment and Management**

Students will assess a habitat using technology available to develop a management plan. Students will identify factors of the ecosystem to implement their plan of management or restoration.

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.

Outcome 5.4

Surveying and Mapping: Perform surveying procedures to construct a site plan.

Competency:

5.4.2. Interpret maps, topographic site plans, deeds and aerial or satellite imagery for site planning.

5.4.3. Perform site measurements.

5.4.4. Integrate map and surveying data into geographic information system (GIS) or computer aided

design (CAD) software.

Outcome 6.10

Ecosystems: Evaluate biotic and abiotic components and relationships in ecosystems to apply restoration and conservation practices that maintain functionality.

Competency:

6.10.1 Describe ecological levels, including population, community, ecosystem and biosphere.

6.10.2 Distinguish the flow of energy through ecosystems.

6.10.3 Identify and classify interactions among organisms, including predation, symbiosis and competition, to determine species interdependent relationships.

6.10.4 Describe the process of succession and its impact on ecosystems.

6.10.5 Connect biotic interactions with the abiotic environment.

6.10.6 Describe biogeochemical cycles (e.g., carbon, nitrogen, phosphorous, hydrological) and their roles in maintaining equilibrium in an ecosystem.

6.10.7 Identify interactions of ecosystems to differentiate biomes.

6.10.8 Select and implement restoration ecology practices to repair damaged ecosystems.

6.10.9 Determine the impact of native and non-native invasive species on ecosystems.

6.10.10 Describe the relationship between evolution and ecosystems.

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.

6.11.4 Evaluate the current and historical interactions between human activities and habitats.

6.11.5 Differentiate threatened, endangered, extirpated and extinct species.

6.11.6 Survey and monitor species within a habitat.

6.11.7 Explain the role of various stakeholders, including individuals, non-governmental organizations (NGOs), corporations and governments in habitat restoration and conservation.

6.11.8 Implement techniques used in habitat management, mitigation, enhancement and restoration.

6.11.9 Implement practices to enhance biological diversity.

6.11.10 Develop a management plan for the sustainability of a specific habitat using environmental practices.

**Unit: Population Management**

Using industry standards, students will use identification tools to manage animal populations in a habitat. Students will follow all local, state, and federal guidelines to manage ecosystems and habitats.

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 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).

2.3.6 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.

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

Outcome 2.6

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

Competency:

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

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, euthanasia).

Outcome 3.8

Research and Experiments: Conduct a problem-based study, applying scientific methodology and using descriptive statistics to communicate and support predictions and conclusions.

Competency:

3.8.1 Identify research problems and structure a statistical experiment, simulation or study related to the problem.

3.8.2 Design a research plan, including the significance of the problem, purpose, variables, hypotheses, objectives, methods of study and a list of materials.

3.8.3 Distinguish between dependent, independent and control variables in an experiment.

3.8.4 Establish and implement procedures for systematic collection, organization and use of data.

3.8.5 Select and apply sampling methods that appropriately represent the population to be studied.

3.8.6 Define the concepts of confidence limit and significant figures.

3.8.7 Document results of the experiment in a laboratory notebook, including a statement of purpose, experimental designs, observations, results, conclusions and next steps.

3.8.8 Compute measures of central tendency and dispersion to interpret results and draw conclusions.

3.8.9 Describe the relationships among variables using correlations and draw conclusions.

3.8.10 Create, interpret and use tabular and graphical displays and describe the data.

3.8.11 Draw conclusions based on observations and data analyses, recognizing that experimental results must be open to the scrutiny of others.

Outcome 6.10

Ecosystems: Evaluate biotic and abiotic components and relationships in ecosystems to apply restoration and conservation practices that maintain functionality.

Competency:

6.10.9 Determine the impact of native and non-native invasive species on ecosystems.

Outcome 6.11

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

Competency:

6.11.6 Survey and monitor species within a habitat.

**Unit: Animal Care & Welfare - diseases, nutrition**

After understanding animal nutrition, students will identify factors that will lead to a healthy population of wildlife in an ecosystem. Students will identify factors indicative of disease and implement strategies of control.

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:

2.1.1 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.

2.1.4 Identify and address major nutrient deficiency and toxicity symptoms.

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.

2.1.7 Formulate and prepare rations and diets for production, specialty markets and special diets.

2.1.8 Select and implement feeding and watering practices and systems, based on the animal population and purpose.

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:

2.3.3 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.

2.3.10 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.

Competency:

2.4.1 Identify general infectious and noninfectious causes of diseases and disorders.

2.4.2 Examine an animal to evaluate its general condition.

2.4.3 Investigate and appraise signs of pain, distress, allergic reactions and lameness.

2.4.4 Assess genetic abnormalities in the skeleton, body form and body functions and identify the symptoms associated.

2.4.5 Explain the symptoms that are associated with an abnormality caused by environmental factors.

2.4.6 Assess symptoms of animals to identify diseases caused by a microorganism (e.g., parasite, virus, bacteria, fungi, protozoa).

2.4.7 Identify and describe zoonotic diseases.

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

2.4.9 Implement disease prevention methods and procedures.

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.

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.

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

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

Outcome 7.7

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

Competency:

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

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.

**Unit: Water Habitat Management**

Using industry standards, students will assess and monitor water quality for aquatic life. Students will use planning skills to implement a working management plan.

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).

6.2.2 Measure pH, dissolved oxygen (DO), biological oxygen demand (BOD), temperature and macroinvertebrate populations to determine water quality.

6.2.3 Measure hardness, nitrogen, phosphorus, vegetation and physical characteristics of lentic and lotic waters to determine water quality.

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.

6.2.6 Monitor and analyze water quality and quantity.

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

6.4.8 Define, delineate and assess the volume of watersheds and streams.

6.4.9 Assess the potential for surface water and groundwater contamination at a specific site.

6.4.10 Implement management practices that conserve and sustain water.

**Unit: Public Relations**

Using communication skills, students will facilitate presentations to local and community groups on the importance of wildlife and fishery management.

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.

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.

1.1.5 Develop strategies for self-promotion in the hiring process (e.g.,filling out job applications, resumé writing, interviewing skills, portfolio development).

1.1.6 Explain the importance of work ethic, accountability and responsibility and demonstrate associated behaviors in fulfilling personal, community and workplace roles.

1.1.7 Apply problem-solving and critical-thinking skills to work-related issues when making decisions and formulating solutions.

1.1.8 Identify the correlation between emotions, behavior and appearance and manage those to establish and maintain professionalism.

1.1.9 Give and receive constructive feedback to improve work habits.

1.1.10 Adapt personal coping skills to adjust to taxing workplace demands.

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.

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 1.4

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

Competency:

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

1.4.3 Verify compliance with security rules, regulations and codes (e.g., property, privacy, access, accuracy issues, client and patient record confidentiality) pertaining to technology specific to the industry pathway.