**Urban Forestry**

Subject Code: 010740

Course & Unit Descriptions

**Course Description:**

Students will apply techniques and practices promoting the care and management of trees for residential and commercial purposes. Topics include principles of soil management, dendrology and pest management. Furthermore, students will analyze budgets; and develop short and long-range management plans that balance environmental and economic goals supporting sustainable land use patterns. Throughout the course, students will apply principles of rigging, advanced rope techniques, and chainsaw applications for tree pruning and removal.

**Unit: Safety**

Students will demonstrate the proper and safe use of arboriculture-related equipment and climbing technique associated with tree care.

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.

1.12.4 Describe how working under the influence of drugs and alcohol increases the risk of accident, lowers productivity, raises insurance costs and reduces profits.

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.

1.12.12 Apply inspection, rejection criteria, hitch configurations and load handling practices to slings and rigging hardware.

1.12.13 Demonstrate the proper use of American National Standards Institute (ANSI) hand signals.

1.12.15 Select and operate fire extinguishers based on the class of fire.

**Unit: Dendrology**

The student will learn to identify and manage plant species important to the arboriculture industry.

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.

8.4.2 Identify plant anatomical structures and tissues.

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

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

8.4.5 Understand aerobic respiration and its relationship to plant growth and management.

**Unit: Plant Growth and Structure**

The student will develop and evaluate commercial plant production and management plans associated with pest management, plant propagation and management of plant production.

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:

8.4.6 Identify the principles of primary and secondary plant growth.

8.4.7 Identify the plant responses to plant growth regulators and different forms of tropism.

8.4.8 Understand the influence of environmental factors on plant growth, development and maintenance.

8.4.9 Manipulate natural and artificial factors to influence plant germination, growth and development.

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).

8.4.13 Evaluate and implement transplanting practices.

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.

**Unit: Soils**

The student will identify the physical, biological, and chemical properties of soil and other plant growing media. The learner will develop and implement an appropriate plan for soil uses.

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.

6.1.8 Describe soil limitations in agronomic, urban and natural resource practices.

6.1.9 Evaluate soil survey data and implement management decisions.

**Unit: Equipment Operation and Maintenance**

The student will develop and analyze a design for specific programmatic applications. Students will develop and implement a maintenance program for arboriculture.

Outcome 5.3

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

Competency:

5.3.12 Estimate material, construction and equipment needs, availability and costs.

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: Rope Systems and Climbing**

The student will inspect arboriculture equipment, develop emergency management procedures and implement approved safety policy using ANSI and OSHA standards.

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.

1.12.8 Identify safety hazards and take corrective measures.

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

1.12.12 Apply inspection, rejection criteria, hitch configurations and load handling practices to slings and rigging hardware.

1.12.13 Demonstrate the proper use of American National Standards Institute (ANSI) hand signals.

Outcome 4.1

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

Competency:

4.1.2 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.

**Unit: Plant Diseases and Damage**

Students will determine conservation and restoration practices based on specific arboriculture ecosystem characteristics. Students will identify plant pests and levels of controlling methods.

Outcome 6.10

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

Competency:

6.10.5 Connect biotic interactions with the abiotic environment.

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

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:

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

8.1.5 Collect soil and plant tissue for testing and analysis.

8.1.7 Distinguish between biotic and abiotic factors (e.g., minerals, pH, microorganisms) that influence and optimize the availability of nutrients for plants.

8.1.9 Determine the nutrient content of organic and inorganic fertilizers.

8.1.10 Select the methods and time of nutrient application and apply nutrients.

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.

8.3.4 Determine and implement pest management safety practices (e.g., safety data sheets [SDSs], United States Environmental Protection Agency [EPA], United States Occupational Safety and Health Administration [OSHA], personal protective equipment [PPE], worker protection standards [WPS], refuge management strategy).

8.3.5 Evaluate the effectiveness of a pest management plan.

8.3.7 Describe the types and functions of biological and mechanical control methods.

8.3.8 Describe the types and functions of chemical pesticide control measures.

8.3.9 Develop an IPM plan, based on pest life cycles, available treatments, application methods and the impact on the environment.

8.3.10 Select application methods and implement an IPM plan.

8.3.11 Evaluate IPM plans and applications for their impact on the environment and their effectiveness.

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:

8.4.9 Manipulate natural and artificial factors to influence plant germination, growth and development.

**Unit: Business Operations**

Students will develop business goals and objectives using real-world examples of various organizational and business structures. Students will budget resources, evaluate outcomes, and forecast future budgetary needs according to standard business principles.

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:

1.6.1 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.

1.6.5 Describe organizational structure, chain of command, the roles and responsibilities of the organizational departments and interdepartmental interactions.

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

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

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

1.6.9 Explain how the performance of an employee, a department and an organization is assessed.

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

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.

1.8.5 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).

1.8.6 Identify the advantages and disadvantages of carrying cost and Just-in-Time (JIT) production systems and the effects of maintaining inventory (e.g., perishable, shrinkage, insurance) on profitability.

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).

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.

1.10.4 Identify the company policies and procedures for initiating product and service improvements.

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.

**Unit: Communication & Information Management**

Students will research and conduct presentations using a variety of computer applications including Internet. Students will utilize personal information management to develop recordkeeping and communication skills. Students will organize information accurately and practice workplace communication techniques.

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.

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).

1.4.3 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.

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.

1.4.7 Use personal information management and productivity applications to optimize assigned tasks (e.g., lists, calendars, address books).

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

**Unit: Business Leadership & Employability Skills**

Students will develop critical thinking and problem solving skills through the use of a variety of practical scenarios. Students will demonstrate leadership skills through participation with peer groups, support services, and professional organizations.

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.

1.1.11 Recognize different cultural beliefs and practices in the workplace and demonstrate respect for them.

1.1.12 Identify healthy lifestyles that reduce the risk of chronic disease, unsafe habits and abusive behavior.

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.