Forestry and Woodland Ecosystems
Subject Code: 010730
Course & Unit Descriptions

Course Description:

Learners will apply principles of botany, dendrology and silviculture to the management of forests and forest ecosystems. Learners will apply principles of timber cruising with surveying and mapping techniques to take forest measurements. Learners will develop the knowledge and skills necessary for forest reforestation, timber stand improvement, timber harvesting and forest product utilization. Learners will operate and maintain forestry equipment, apply fire management practices, and understand related regulations, laws, and policy issues.

Unit: Safety

Students will learn safety procedures with basic tools and equipment. Students will evaluate work environment and follow safety procedures with tools and equipment.

Benchmark: 4.1 Safety Procedures
Level 1: Follow safety procedures in general situations with basic tools and equipment, evaluate work environment and seek assistance to rectify the problem
Level 2: Follow safety procedures in specific situations with specialized tools and equipment, evaluate situation and take corrective action

Indicators
4.1.01 Demonstrate knowledge of safety rules and regulations
4.1.02 Interpret safety signs and symbols
4.1.03 Model safe attitudes and behaviors (e.g., lifting, climbing)
4.1.04 Identify safety hazards and take corrective measures
4.1.05 Use safety equipment in accordance with established procedures
4.1.06 Follow established procedures for the administration of first aid and contact emergency medical personnel when necessary

Academic Standards
English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)

Benchmark: 5.6 Emergency Response
Level 1: Comply with all the components of an emergency response plan.
Level 2: Simulate the appropriate response to an emergency situation.

Indicators
5.6.01 Analyze factors that influence environmental conditions.
5.6.02 Identify responses to emotional, physiological and environmental stress.

Academic Standards
English: Use appropriate self-monitoring strategies for comprehension. (Reading Process C, 8-10; Reading Process C, 11-12)
Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)

Benchmark: 5.6 Emergency Response
Level 1: Comply with all components of an emergency response plan
Level 2: Simulate the appropriate response to an emergency situation

Indicators
5.6.01 Analyze factors that influence environmental conditions
5.6.03 Identify and implement various emergency response plans

Academic Standards
English: Use appropriate self-monitoring strategies for comprehension. (Reading Process C, 8-10; Reading Process C, 11-12)

Unit: Dendrology, Silvaculture, and Reforestation

Students will learn the physical, biological, and chemical properties of soils and other plant growing media. Students will identify ecosystems along with inventorying and evaluating specific ecosystems. Students will select, apply, and evaluate the effects of macronutrients on plants along with identifying deficiencies found in the plants and the soil. Students will apply management skills to propagate plants, to control pest management, and manage plant production.

Benchmark: 5.1 Soils
Level 1: Determine and analyze the physical, biological and chemical properties of soils and other plant growing media
Level 2: Utilize knowledge of soil characteristics and soil information resources to overcome any existing soil use limitations

Indicators
5.1.03 Interpret soil survey data to implement conservation practices

Academic Standards
English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Math: Describe and interpret rates of change from graphical and numerical data. (Algebra J, 8-10) Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)
Social Studies: Use appropriate data sources and geographic tools to analyze and evaluate public policies. (Geography C, 11-12)

Benchmark: 5.3 Ecosystems
Level 1: Identify ecosystems and compare components of ecosystems
Level 2: Inventory and evaluate habitats of specific ecosystems

Indicators
5.3.05 Inventory and evaluate characteristics of different ecosystems (e.g., pond, stream, crop lands, open land, brush lands, grasslands, woodlands, wetlands)

Academic Standards
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Science: Explain that many processes occur in patterns within the Earth's systems. (Earth and Space Sciences B, 9-10)

Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 7.1 Plant Nutrition
Level 1: Select and apply macronutrients, using basic application methods, and recognize the effect on plants and environment
Level 2: Diagnose macronutrient and common micronutrient deficiencies in specific plants and select and apply macronutrients and micronutrients, using specialized application methods

Indicators
7.1.06 Analyze test data from soil and plant tissue, make inferences and draw conclusions for optimum management
7.1.07 Determine the biotic and abiotic factors that influence and optimize availability of nutrients to plants (e.g., pH, microorganisms, growth media)

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science: Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10)

Benchmark: 7.2 Plant Reproduction
Level 1: Select and apply basic methods for propagating common types of plants
Level 2: Select and apply specialized methods for propagating plants

Indicators
7.2.01 Identify reproductive anatomy of plants and describe their physiological functions
7.2.02 Determine the biotic and abiotic factors that influence and optimize plant reproduction (e.g., insects, light, temperature, microorganisms, moisture, location)
7.2.03 Select seeds/seed stock for desired traits (e.g., color, drought resistance, chemical resistance, environmental impact)
7.2.04 Select and use methods to create desired traits in seeds and fruits (e.g., detasseling, mechanical pollination)
7.2.06 Compare and contrast variations of plant reproductive systems among plant species and their adaptive and non-adaptive values

Academic Standards
English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Science: Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10)

Benchmark: 7.3 Pest Management
Level 1: Identify common types of plant pests and apply basic pest management control methods
Level 2: Scout and identify specific plant pests and plant damage and apply specialized pest management control methods

Indicators
7.3.02 Examine interrelationships between plants, pests, humans and environment (e.g., non-native species, climate change)
7.3.04 Determine and implement pest management safety practices (e.g., MSDS, EPA, OSHA, PPE)

7.3.05 Develop an integrated pest management plan based on pest life cycles, available treatments and application methods
7.3.06 Select application methods, implement pest control plan (i.e. organic and non-organic) and evaluate effectiveness and impact on environment

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Find, use and interpret measures of center and spread, such as mean and quartiles, and use those measures to compare and draw conclusions about sets of data. (Data Analysis D, 8-10)

Science: Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10)

Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 7.4 Plant Production and Management

Level 1: Manage growth of common types of plants
Level 2: Manage growth of specific types of plants using specialized equipment

Indicators

7.4.01 Identify and classify seeds and plants at all stages of growth
7.4.02 Identify plant anatomical structures and tissues (e.g., roots, stems, flowers, leaves, fruits, seeds)
7.4.03 Describe physiological functions of plants (e.g., photosynthesis, respiration, transpiration, absorption)
7.4.04 Identify and classify plants using taxonomy
7.4.05 Select seeds and plants (e.g., production, ornamental, erosion control, genetically modified organism [GMO], moisture control, bioremediation)
7.4.06 Manipulate abiotic and biotic factors (e.g., irrigation, mulch, lighting, temperature, drainage) to alter plant germination, growth and development
7.4.07 Evaluate and demonstrate planting practices (e.g., population rate, germination/seed vigor, inoculation, seed and plant treatments, cuttings and pot in pot, type of planter)
7.4.08 Evaluate and implement transplanting practices
7.4.10 Control plant growth (e.g., pruning, pinching, chemical, disbudding)
7.4.11 Determine maintenance schedule for plant management plan

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)

Science: Explain the flow of energy and the cycling of matter through biological and ecological systems (cellular, organismal and ecological). (Life Sciences D, 9-10)

Unit: Measuring and Timber Harvesting

Students will evaluate soils for properties suitable for growing timber for production. Students will learn how to handle, harvest, and store their timber products.

Benchmark: 5.1 Soils

Level 1: Determine and analyze the physical, biological and chemical properties of soils and other plant growing media
Level 2: Utilize knowledge of soil characteristics and soil information resources to overcome any existing soil use limitations

Indicators
5.1.03 Interpret soil survey data to implement conservation practices
5.1.04 Select techniques that reduce soil erosion and compaction based on soil and land properties (e.g., no till, subsurface and watershed drainage)

Academic Standards
English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Math: Describe and interpret rates of change from graphical and numerical data. (Algebra J, 8-10)
Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)
Social Studies: Use appropriate data sources and geographic tools to analyze and evaluate public policies. (Geography C, 11-12)

Benchmark: 7.5 Harvesting, Handling and Storage
Level 1: Harvest, handle and store plants and plant products
Level 2: Identify and minimize harvest loss and select preferred harvesting, handling and storage method

Indicators
7.5.01 Determine crop maturity
7.5.02 Identify safe harvesting, handling and storage practices
7.5.03 Determine and control environmental conditions relative to harvesting, handling and storage
7.5.04 Demonstrate harvesting, handling and storage techniques to minimize loss and maximize economic return
7.5.05 Calculate yield and loss of harvesting, processing and storage

Academic Standards
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Unit: Mapping and GIS

Students will learn how to interpret maps and topographic site plans using surveying equipment to construct a basic site plan. Students will use GIS to interpret and produce maps.

Benchmark: 4.11 Surveying and Mapping
Level 1: Interpret maps/topographic site plans
Level 2: Use surveying equipment to construct a basic site plan

Indicators
4.11.01 Identify civil drafting symbols and abbreviations
4.11.02 Read maps, topographic site plans, deeds and/or aerial/satellite imagery
4.11.03 Perform site measurements
4.11.04 Integrate map and surveying data in Geographic Information System (GIS) or Computer Aided Design (CAD)

Academic Standards
English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Social Studies: Use appropriate data sources and geographic tools to analyze and evaluate public policies. (Geography C, 11-12)

Benchmark: 5.15 Geographic Information Systems (GIS)
Level 1: Use GIS software to interpret maps
Level 2: Use GIS computer applications to produce maps

Indicators
5.15.02 Explain map projections and the use of scales
5.15.03 Describe data structures (e.g., vector, grid, TIN, etc.)
5.15.08 Determine position on the earth

Academic Standards
English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Social Studies: Use appropriate data sources and geographic tools to analyze and evaluate public policies. (Geography C, 11-12)

Unit: Forest Pests and Diseases

Students will identify forest ecosystems and their components. Students will identify the common types of plant pests and levels of controlling methods.

Benchmark: 5.3 Ecosystems
Level 1: Identify ecosystems and compare components of ecosystems
Level 2: Inventory and evaluate habitats of specific ecosystems

Indicators
5.3.09 Determine the impact that native and non-native invasive species have on ecosystems

Academic Standards
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Science: Explain that many processes occur in patterns within the Earth's systems. (Earth and Space Sciences B, 9-10)
Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Benchmark: 7.3 Pest Management
Level 1: Identify common types of plant pests and apply basic pest management control methods
Level 2: Scout and identify specific plant pests and plant damage and apply specialized pest management control methods

Indicators
7.3.01 Identify and classify plant pests (i.e., insects, pathogens, weeds, diseases, animals)
7.3.02 Examine interrelationships between plants, pests, humans and environment (e.g., non-native species, climate change)
7.3.04 Determine and implement pest management safety practices (e.g., MSDS, EPA, OSHA, PPE)
7.3.05 Develop an integrated pest management plans based on pest life cycles, available treatments and application methods
7.3.06 Select application methods, implement pest control plan (i.e. organic and non-organic) and evaluate effectiveness and impact on environment

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Find, use and interpret measures of center and spread, such as mean and quartiles, and use those measures to compare and draw conclusions about sets of data. (Data Analysis D, 8-10)

Science: Explain the structure and function of ecosystems and relate how ecosystems change over time. (Life Sciences F, 9-10)

Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Unit: Equipment Operation and Maintenance

Students will learn to inspect and provide maintenance to basic machinery and equipment. Students will learn how to safely inspect and calibrate specialized equipment needed for forestry production.

Benchmark: 4.2 Stationary and Mobile Equipment Maintenance

Level 1: Inspect and provide basic maintenance to basic machinery, instruments, stationary and mobile equipment and facility

Level 2: Inspect and maintain specialized machinery and equipment according to schedule

Indicators

4.2.01 Perform a machine condition inspection
4.2.02 Lubricate machinery and equipment
4.2.03 Ensure presence and function of safety systems and hardware
4.2.04 Service basic electrical systems (e.g., fuses and bulbs)
4.2.05 Perform machine adjustments (e.g., belts, clippers, drive chains)
4.2.06 Service filtration systems
4.2.07 Identify, select and maintain fluid levels
4.2.08 Maintain machinery, equipment, instruments and facility cleanliness, appearance, and safety
4.2.09 Inspect and maintain fluid conveyance and storage components (e.g., hoses and lines, valves, nozzles)
4.2.10 Conduct preventative maintenance and identify causes of malfunctions and failures
4.2.12 Inspect and maintain tooling
4.2.13 Maintain lifting equipment (e.g., cranes, chains, slings)

Academic Standards

English: Use appropriate self-monitoring strategies for comprehension. (Reading Process C, 8-10; Reading Process C, 11-12)

Math: Apply mathematical knowledge and skills routinely in other content areas and practical situations. (Mathematical Processes B, 8-10)

Benchmark: 4.3 Equipment Operation

Level 1: Inspect and safely operate precalibrated equipment

Level 2: Inspect and safely operate specialized equipment with some limitations to adjustments and functions

Indicators

4.3.01 Follow manufacturer's recommended operating procedures and adjustment specifications
4.3.02 Describe function, limitations, and proper use of equipment, equipment controls and instrumentation
4.3.03 Perform pre-operation inspection and adjustments
4.3.04 Perform appropriate start-up, operating and shut-down procedures
4.3.05 Identify, select and exhibit the desired application of hand and power tools

4.3.06 Perform post-operating inspection and adjustments

Academic Standards

English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)

Math: Apply mathematical knowledge and skills routinely in other content areas and practical situations. (Mathematical Processes B, 8-10)

Unit: Forest Products

Students will use marketing strategies to promote the forest industry and its products. Students will learn customer service and use its applications to work with their customers and foster positive working relationships.

Benchmark: 3.1 Marketing

Level 1: Promote a product or service using basic strategies for packaging, display and publicity
Level 2: Develop and market a product or service to maximize profits and optimize cost

Indicators

3.1.01 Select target market and consumers
3.1.04 Select channels of distribution
3.1.06 Identify and evaluate methods of marketing products and services
3.1.07 Promote products and services
3.1.08 Develop public relations campaigns
3.1.10 Identify and evaluate purchase options (e.g., finance options, lease, cash, rental)

Academic Standards

English: Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Social Studies: Analyze how scarcity of productive resources affects supply, demand, inflation and economic choices. (Economics A, 11-12)

Benchmark: 3.2 Sales and Customer Service

Level 1: Use customer service and sales techniques to foster positive relationships with customers and conduct sales
Level 2: Use sales techniques to close the sale of a product/service and handle complex customer issues

Indicators

3.2.01 Identify key components to organize a sale
3.2.02 Develop sales goals and incentive programs
3.2.03 Forecast sales and delivery times
3.2.04 Prospect for new customers
3.2.05 Discuss and evaluate the appropriateness of different sales techniques/approaches in specific situations
3.2.06 Develop and conduct sales presentation
3.2.08 Build and develop customer relationships
3.2.09 Apply appropriate questioning techniques to determine client needs and wants
3.2.11 Complete sales transactions and close-out procedures (e.g., handle money, operate cash register, scan bar codes, record sales, write invoices/orders)
3.2.12 Utilize follow-up activities/strategies and provide post-sale service
3.2.13 Handle customer complaints

Academic Standards

English: Use a variety of strategies to enhance listening comprehension. (Communication A, 8-10; Communication A, 11-12)

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Benchmark: 7.5 Harvesting, Handling and Storage

Level 1: Harvest, handle and store plants and plant products

Level 2: Identify and minimize harvest loss and select preferred harvesting, handling and storage method

Indicators

7.5.6 Maintain and/or enhance quality of plant products in harvesting, handling and storage (e.g., temperature, humidity, retardants, light, chemicals, contamination)

7.5.7 Prepare products for sale, transportation and storage

Academic Standards

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)