Landscape Design and Build
Subject Code: 010630
Course & Unit Descriptions

Course Description:

Students will develop skills in landscape planning, design, estimation and application. Basic principles of design and engineering will be emphasized. Drawing and drafting techniques will include the use of technology such as computer-aided design. Students will incorporate and construct hardscapes, and will examine the use of artificial lighting and water systems. Environmental effects of landscape will be evaluated and eco-friendly techniques applied. Business management procedures, project estimations, and sales techniques will also be practiced.

Unit: Safety

Students will demonstrate and model the proper rules and regulations for onsite safety and take the measures to avoid/correct potential hazards. Students will demonstrate first aid and how to properly handle an emergency response.

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)

Unit: Design & Estimate

Using architectural and engineering principles, students will be able to complete site inventory. Students will analyze, design, and prepare drawings/prints. Students will be able to determine materials through estimating, and calculating all required materials for hardscapes, softscapes and water features.

Benchmark: 4.10 Design and Estimate
Level 1: Utilize elements and principles of design for an agricultural application
Level 2: Design a basic agricultural application for a desired outcome

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

4.10.02 Complete a site inventory and analysis (e.g., physical conditions, design needs, code requirements, environmental impact, utilities requirements)
4.10.03 Develop a program list, including intended use, budget, economics, customer wants and needs, and maintenance
4.10.04 Apply principles of balance, proportion and scale, focal point, emphasis, rhythm, harmony and unity in creating a design
4.10.05 Apply the elements of line, form, texture and color in creating a design
4.10.06 Incorporate principles of design (e.g., space, scale, proportion, order) and apply organizational and spatial principles to a design
4.10.07 Calculate the space requirements and compute various attributes, including length, angle measurement, surface area and volume
4.10.08 Prepare sketches, drawings, prints, specifications and construction details
4.10.09 Use design-drawing tools including Computer Aided Design (CAD) software and other industry-specific software
4.10.10 Identify construction documents, common scales and specifications and select materials used in construction/fabrication
4.10.11 Estimate material, construction and equipment needs and costs
4.10.12 Establish the sequential steps of construction/installation

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: 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: Surveying & Mapping

Students will use civil drafting symbols, abbreviations, maps, topographic site plans, deeds, and aerial/satellite imagery in mapping. Students will integrate map and survey data into Geographic Information System or Computer Aided Design.

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)

Unit: Landscape Construction

Students will lay out, cut, smooth, shape, and bore construction materials. Students will be able to describe, install and manipulate the physical properties of brick/paver, mortar, block, cement, and concrete materials.

Benchmark: 4.12 Construction

Level 1: Identify tools and materials and perform operations fundamental to construction
Level 2: Construct a scale-model to illustrate various construction components

Indicators

4.12.01 Lay out, cut, smooth, shape, and bore construction materials
4.12.02 Join similar and dissimilar construction materials (e.g., wood to wood, wood to concrete, wood to steel)
4.12.03 Lay out, cut and install decks/floors
4.12.04 Lay out, cut, assemble and brace framing components (foundation, joists, plates, subfloor, stud, sills)
4.12.05 Lay out, cut and install steps/stairs
4.12.06 Lay out, cut and install roof framing (top plates, ridge boards, common rafters, prefabricated roof trusses, fascia and soffit) and roof trim accessories (drip edges, flashing and vents)
4.12.07 Lay out and install roofing material (shingles, shakes, metal)
4.12.08 Install exterior doors and window units with hardware
4.12.09 Install exterior sheathing and siding with trim accessories (e.g., gutters and downspouts, posts and railing)
4.12.10 Install glass, rigid plastic panels and/or film plastic
4.12.11 Insulate facility (i.e., draft stops, weather stripping, thermal insulation and vapor barriers)
4.12.12 Analyze surface condition and select and apply abrasives and fillers
4.12.13 Contrast surface coatings and apply under appropriate environmental conditions
4.12.14 Contrast options and install fencing
4.12.15 Compare and contrast the structural properties, grades and types of construction materials (e.g., wood and wood products, metals, vinyls)

Academic Standards

Math:	Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science:	Describe the identifiable physical properties of substances e.g., color, hardness, conductivity, density, concentration and ductility). Explain how changes in these properties can occur without changing the chemical nature of the substance. (Physical Sciences C, 9-10)

Benchmark: 4.13 Brick, Block, and Concrete

Level 1: Identify tools and materials and calculate amounts needed for a project using brick/paver, block, stone or concrete
Level 2: Construct a project using brick/paver, block, stone or concrete

Indicators

4.13.01 Describe physical properties of brick/paver, mortar, block, cement, and concrete
4.13.02 Explain chemical reactions within and between materials
4.13.03 Describe air ratio and slump
4.13.04 Identify layout and elevations using measurements to scale
4.13.05 Estimate construction and material cost for brick/paver, mortar, block, stone and concrete
4.13.06 Lay out and construct forms and reinforce using steel, wire and other materials
4.13.07 Mix, place and finish concrete and mortar
4.13.08 Install footers, lintels, sills, poured walls, floors and accessories
4.13.09 Install gravel and sand pads
4.13.10 Install cut masonry (e.g., brick/paver, stone, concrete)

4.13.11 Install joints and cure concrete
4.13.12 Identify the composition of concrete and describe the chemical reaction of curing
4.13.13 Select curing, coloring and texturing additives for a specific purpose

Academic Standards

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

Science: Explain how atoms react with each other to form other substances and how molecules react with each other or other atoms to form even different substances. (Physical Sciences B, 9-10)

Unit: Landscape Lighting

Students will demonstrate how to compare and contrast electrical systems and components. Students will be able to install and service low-voltage systems.

Benchmark: 4.14 Electrical

Level 1: Identify tools and materials, draw a wiring diagram of a circuit and install the circuit
Level 2: Develop a schematic that illustrates the kind, number and location of outlets and switches in a wiring system and install the design

Indicators

4.14.02 Compare and contrast AC and DC electrical systems and system components
4.14.03 Measure amperage of AC and DC electrical systems and system components
4.14.04 Calculate service requirements for electrical systems
4.14.05 Describe distribution system components
4.14.07 Determine the kind, size, number and location of wiring system components (e.g., outlets, switches, lights, wire, circuit breakers, motors, etc.)
4.14.08 Prepare and connect wires, with appropriate fasteners and anchors, to receptacles, switches and fixtures to standards of the electrical industry
4.14.09 Explain the color-coding of electrical connections
4.14.11 Install and service low-voltage systems (e.g., control systems and lighting systems)

Academic Standards

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

Science: Describe the identifiable physical properties of substances (e.g., color, hardness, conductivity, density, concentration and ductility). Explain how changes in these properties can occur without changing the chemical nature of the substance. (Physical Sciences C, 9-10)

Unit: Landscape Irrigation

Students will be able to calculate daily water needs, identify the common components of a water distribution system and describe their functions. Students will explain the factors affecting water quality and implement practices to maintain or improve quality as it impacts the ecosystem.

Benchmark: 4.15 Water Distribution Systems

Level 1: Identify tools and materials; design a water supply line with fixture and install
Level 2: Design and install a basic water/wastewater distribution system using multiple zones

Indicators

4.15.01 Calculate daily water needs
4.15.02 Identify the common components of a water distribution system and describe their functions

4.15.03 Describe the types and operating principles of pumps and controls used in water supplies
4.15.04 Calculate water demand for specific applications
4.15.05 Detect, test and repair problems in the water supply system
4.15.06 Install and secure waste/drain lines and vents
4.15.07 Install water supply and treatment systems with both plastic and metal components
4.15.08 Perform tests on water supply and drainage systems for pressure and leaks
4.15.09 Describe the types and sources of contamination in water supplies (i.e., fuel storage tanks, septic systems, pesticide mixing areas, hazardous waste, manure storage, livestock yard, and silage effluent) and methods for disinfecting water
4.15.10 Protect pipes from freezing and mechanical damage

Academic Standards

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

Benchmark: 5.2 Water

Level 1: Assess water quality using basic indicators
Level 2: Analyze and interpret the biological, chemical and physical properties of water quality

Indicators

5.2.04 Explain the biotic and abiotic factors affecting water quality
5.2.05 Monitor and analyze water quality and quantity
5.2.06 Explain the interactions between human activities and the earth's hydrosphere (e.g., septic systems, desalinization, point and nonpoint sources of pollution)
5.2.07 Implement practices to maintain or improve water quality

Academic Standards

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

Math: Apply various measurement scales to describe phenomena and solve problems. (Measurement B, 11-12)

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)

Unit: Plant Management

Students will be able to classify, differentiate, and apply the principles of taxonomy, physiological factors/functions (lighting, temperature, drainage /photosynthesis, Krebs cycle), and anatomical structures to influence and optimize plant reproduction and growth. Students will assess plant care based upon soil composition/limitations and develop maintenance schedules based upon environmental factors.

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)
7.4.04 Identify and classify plants using taxonomy
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: Pest Management

Students will use entomology/pathology classifications. Student will apply an integrated pest management program to control native and non-native invasive species. Students will evaluate ecosystems to create positive environmental practices for sustainability of resources.

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)
7.3.03 Analyze and calculate economic threshold of pest damage
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: Landscape Plant Installation

Students will be able to classify, differentiate, and apply the principles of taxonomy, physiological factors (lighting, temperature, drainage), and anatomical structures to influence and optimize transplanting practices, plant reproduction and growth. Students will assess plant care based upon soil composition/limitations and develop maintenance schedules based upon environmental factors. Students will be able to collect data, interpret results and analyze a soil/tissue sample to determine the proper plant nutritional needs and apply appropriate application methods.

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

5.1.01 Classify soil types based on composition (e.g., aggregate size, organic matter, texture)
5.1.02 Inventory soils and determine land use capabilities
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)
5.1.05 Evaluate soil limitations (e.g., wildlife/wetlands habitats, septic systems, drainage, agriculture and socioeconomic considerations, preservation easements)
5.1.06 Explain current and historical interactions between human activities and soils (e.g., wetlands use, urbanization, desertification, finite resources, habitat change, climate change)

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: 7.4 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

7.4.02 Identify plant anatomical structures and tissues (e.g., roots, stems, flowers, leaves, fruits, seeds)
7.4.04 Identify and classify plants using taxonomy
7.4.06 Manipulate abiotic and biotic factors (e.g., irrigation, mulch, lighting, temperature, drainage) to alter plant germination, growth and development
7.4.08 Evaluate and implement transplanting practices
7.4.09 Evaluate/select and prepare soil/media for planting
7.4.10 Control plant growth (e.g., pruning, pinching, chemical, disbudding)
7.4.11 Determine maintenance schedule for plant management plan
7.4.12 Analyze and satisfy plant water requirements
7.4.13 Identify characteristics (e.g., visual appeal, quality, test weights, final usage) of grains, seeds, vegetables, fruits, and ornamental plants

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: 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.

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
3.2.08 Build and develop customer relationships
3.2.09 Apply appropriate questioning techniques to determine client needs and wants
3.2.10 Provide product, warranty and maintenance education to the customer
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: 3.3 Management
Level 1: Select and organize resources to develop a product or a service to be rendered
Level 2: Analyze performance of an enterprise and reallocate resources to achieve goals

Indicators
3.3.01 Evaluate management styles
3.3.02 Explain the characteristics of business plans
3.3.03 Develop business goals/objectives and mission statement
3.3.04 Identify organizational structures of businesses
3.3.07 Establish business relationships
3.3.09 Track performance of business plan

Academic Standards
English: Analyze the features and structures of documents and critique them for their effectiveness. (Reading: Informational Text A, 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: Identify factors, which inhibit or spur economic growth and cause expansions or recessions. (Economics B, 11-12)

Benchmark: 3.5 Purchasing and Inventory
Level 1: Maintain accurate inventory of assets
Level 2: Manage inventory based on budgeting and sales forecasting

Indicators
3.5.01 Explain the nature and scope of purchasing
3.5.04 Discuss types of inventory and evaluate inventory control systems (e.g., Last In, First Out [LIFO]; First In, First Out [FIFO]; Just-In-Time [JIT])
3.5.05 Record inventory usage

Academic Standards
English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Math: Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions. (Measurement F, 8-10)

Unit: Communication & Leadership

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.

Benchmark: 3.7 Communication Skills

Level 1: Integrate a variety of communication techniques to gather and convey information to an individual or small group

Level 2: Conduct a business meeting using decision-making techniques

Indicators

3.7.01 Apply techniques to participate in/facilitate a group discussion
3.7.02 Apply active listening strategies
3.7.04 Articulate ideas and impact audience through verbal and nonverbal communication
3.7.05 Communicate directions in an organized manner appropriate to the audience
3.7.07 Extract relevant, valid information from materials and cite sources of information
3.7.09 Select and use appropriate channel for workplace communication
3.7.10 Practice etiquette when using communication techniques

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: Evaluate the reliability and credibility of sources. (Social Studies Skills and Methods A, 9 -10)

Benchmark: 3.8 Business Leadership

Level 1: Determine appropriate leadership style for a specific situation and apply to the situation

Level 2: Use multiple leadership concepts to change situations and enhance effectiveness in the change process

Indicators

3.8.01 Identify the purpose of leadership, the ethical dimensions of leadership and the relationship between leaders and team members
3.8.02 Identify leadership styles and traits of leaders
3.8.03 Identify the impact of individual differences and different situations on the practice of leadership
3.8.04 Assess strengths and weaknesses of leaders and team members and employ team-building techniques
3.8.05 Participate in and lead a small group with an interdependent task
3.8.06 Think critically and use problem-solving skills to analyze complex and diverse concepts
3.8.07 Use reasoning, judgment and imagination to create new possibilities in situations
3.8.09 Apply conflict-resolution skills
3.8.11 Develop relationships with peer groups, support services, and professional organizations

Academic Standards

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

Math: Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Social Studies: Critique data and information to determine the adequacy of support for conclusions. (Social Studies Skills and Methods B, 11-12)