Agronomic Systems

Subject Code: 010620

Course & Unit Descriptions

Course Description:

This course provides students with the knowledge and scientific principles required for competency in agronomic research and use of technology. Current production practices and global food needs will be examined. Classroom and laboratory experiences will focus on plant systems and processes including the study of plant nutrition, breeding, genetics, and biotechnology as related to the improvement of food, fiber, and horticultural crop production.

Unit: Safety

Students will be able to demonstrate the proper rules and regulations for safety and take corrective measures when hazards arise in the lab. Students will demonstrate first aid and how to properly handle an emergency.

Benchmark: 4.1 Safety Procedures

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
4.1.03 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 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
5.6.03 Identify and implement various emergency response plans
5.6.04 Identify and contact local emergency response teams

Academic Standards

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

Unit: Environmental Science

Students will classify different soil types and determine land capability, conservation practices, and land limitations. Students will also collect, treat and analyze waste materials and those risks associated with accumulating and disposal. Students will also measure water and air quality plus implement practices to improve the quality and interactions between human activity and the earth's systems.

Benchmark: 5.1 Soils

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)
5.1.07 Identify soil forming factors and explain how they produce variability in soils

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: 5.10 Solid Waste and Renewable Resource Management

Level 2: Control and process solid waste using available and alternative technology

Indicators

5.10.01 Collect, analyze, and treat waste materials (e.g., mortalities, manure, garbage)
5.10.02 Identify the risks associated with solid waste accumulation, utilization and disposal
5.10.03 Determine acceptable site for disposal of solid waste
5.10.04 Describe the process of aerobic and anaerobic waste decomposition (biotic and abiotic influences)
5.10.05 Describe and monitor solid waste disposal procedures (e.g., landfills, lagoon, run-off)
5.10.06 Describe and implement waste management methods (e.g., composting facility, waste incineration, recycling)
5.10.07 Explain control processes and potential use for waste byproducts (e.g., landfill gas, sludge, manure, methane)
5.10.08 Describe standard operational techniques and identify design requirements for specific purposes (e.g., landfill, lagoon, leachate treatment)
5.10.09 Describe site closure methods and post-closure monitoring
5.10.10 Determine solid waste volume generated by an operation or facility

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)

Math: Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 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 2: Analyze and interpret the biological, chemical and physical properties of water quality

Indicators
5.2.01 Measure pH, dissolved oxygen (DO), biological oxygen demand (BOD), temperature and macro invertebrate populations to determine water quality
5.2.02 Measure hardness, nitrogen, phosphorus, vegetation and physical characteristics of lentic and lotic waters to determine water quality
5.2.03 Explain the hydrological cycle (e.g., condensation, evaporation, transpiration) and how human activity impacts the cycle
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)

Benchmark: 5.3 Ecosystems
Level 2: Inventory and evaluate habitats of specific ecosystems

Indicators
5.3.01 Explain and illustrate basic ecological principles and cycles (e.g., nitrogen cycle, food web, energy pyramid)
5.3.02 Explain biotic (plant and animal) interactions with the abiotic (non-living) environment
5.3.03 Differentiate between renewable and nonrenewable components of ecosystems
5.3.04 Model positive environmental practices for sustainability of resources
5.3.05 Inventory and evaluate characteristics of different ecosystems (e.g., pond, stream, crop lands, open land, brush lands, grasslands, woodlands, wetlands)
5.3.06 Discuss restoration ecology and its role in repairing damaged landscapes
5.3.07 Identify and contrast biomes globally
5.3.08 Determine the factors that affect ecological succession
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: 5.4 Contaminants

Level 2: Assess affected area, determine the source and type of contaminant, and respond appropriately

Indicators

5.4.01 Determine types, sources and impact of natural and man-made contaminants (e.g., manure; wastewater; soil; agricultural, residential and industrial chemicals)
5.4.02 Explain and implement programs and policies related to contaminants
5.4.03 Identify, comply with and implement contaminant control, remediation and prevention practices (e.g., biological, radiological, sanitation, buffer strips for run-off)
5.4.04 Monitor, analyze and evaluate levels of contaminants from point source and non-point source

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
Math: Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 8-10)
Science: Describe how human activities can impact the status of natural systems. (Life Sciences G, 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: 5.5 Air

Level 2: Assess air quality and determine its impact on the environment

Indicators

5.5.01 Determine chemical and physical properties of air (e.g., composition, density, pressure)
5.5.02 Explain chemical cycles and how they relate to the biosphere, geosphere and atmosphere (e.g., nitrogen cycle, oxygen cycle, sulfur cycle)
5.5.03 Explain human and natural factors affecting air quality (e.g., volcanic eruptions, forest fires, greenhouse gases, dust, farming practices)
5.5.04 Monitor and evaluate air quantity and quality
5.5.05 Assess the potential for air contamination at a specific site

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 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)

Unit: Plant Production and Management

Students will be able to identify and classify plant pests along with their interrelationships between plants, humans and the environment. Students will identify and classify at all stages of growth seeds and plants along with studying their anatomical structures and tissues. Students will be able to determine crop maturity and the safe handling, storage, and harvesting of crops.

Benchmark: 7.3 Pest Management

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: 7.4 Plant Production and Management

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
7.4.09 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)

Benchmark: 7.5 Harvesting, Handling and Storage

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
7.5.06 Maintain and/or enhance quality of plant products in harvesting, handling and storage (e.g., temperature, humidity, retardants, light, chemicals, contamination)
7.5.07 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)

Unit: Plant Nutrients

Students will identify the functions and sources of macronutrients and micronutrients. Students will be able to identify the symptoms and causes of plant nutrient deficiencies plus test the soil and tissue. Students will identify and calculate nutrient requirements along with the different application methods.

Benchmark: 7.1 Plant Nutrition

Level 2: Diagnose macronutrient and common micronutrient deficiencies in specific plants and select and apply macronutrients and micronutrients, using specialized application methods

Indicators

7.1.01 Compare and contrast organic and inorganic sources of macronutrients and micronutrients
7.1.02 Describe the functions of macronutrients and micronutrients
7.1.03 Determine nutrient requirements for food-grade, non-food-grade and organic plants
7.1.04 Identify symptoms and causes of plant nutrient deficiencies
7.1.05 Collect and test soil and/or plant tissue
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)
7.1.08 Calculate nutrient requirements and select nutrient sources and additives for optimum economic return
7.1.09 Select application methods, determine time of application, and apply nutrients
7.1.10 Interpret fertilizer labels

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)

Unit: Plant Physiology and Growth

Students will identify the reproductive anatomy of plants and describe their physiological functions along with the factors that influence and optimize plant reproduction. Students will be able to identify and

describe a plant's anatomical and physical functions. Students will be able to select and utilize different seed stock for their traits and be able to use propagation.

Benchmark: 7.2 Plant Reproduction
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)
7.2.05 Select and use methods of asexual plant propagation for desired traits (e.g., grafting, layering, cuttings, cloning)
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)

Unit: Plant Science and Technology

Students will be able to explain the importance of different types of business contracts along with the purpose and impact of government regulations. Students will also research problems and structure a statistical experiment, simulation or study related to the problem. Students will recognize the sources and causes of agents that can contaminate processed and unprocessed food products.

Benchmark: 3.10 Business Regulation, Law and Related Issues
Level 2: Determine the impact of government regulations and societal issues on an environmental project or the performance of a business enterprise

Indicators
3.10.01 Explain the nature and appropriateness of different types of business contracts
3.10.02 Explain the purpose and impact of government regulations
3.10.03 Identify local, state and federal regulations relative to compliance
3.10.04 Assess business liability and describe the consequences of noncompliance
3.10.05 Adhere to business-related documentation requirements
3.10.06 Identify governmental agencies and non-governmental organizations that impact agricultural/environmental issues
3.10.07 Research history, politics and policies related to issues
3.10.08 Assess the impact of issues affecting the industry and recommend solutions

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

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: 3.11 Research and Analysis
Level 2: Conduct a problem-based study applying scientific methodology and using descriptive statistics to communicate and support predictions and conclusions

Indicators
3.11.01 Identify research problems and structure a statistical experiment, simulation or study related to the problem
3.11.02 Create a hypothesis and set the probability of acceptance based on review of valid literature
3.11.03 Establish and implement procedures for systematic collection, organization, and use of data
3.11.04 Select and apply sampling methods that appropriately represent the population to be studied
3.11.05 Create, interpret and use tabular and graphical displays and descriptive statistics to describe data
3.11.06 Compute measures of central tendency and dispersion to interpret results and draw conclusions
3.11.07 Describe the relationships among variables using correlations and draw conclusions
3.11.08 Draw conclusions based on observations and/or data analysis and disseminate information to interested parties

Academic Standards
English: Formulate open-ended research questions suitable for inquiry and investigation and adjust questions as necessary while research is conducted. (Research A, 8-10; Research A, 11-12)
Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)
Science: Participate in and apply the processes of scientific investigation to create models and to design, conduct, evaluate and communicate the results of these investigations. (Scientific Inquiry A, 9-10)

Benchmark: 3.12 Agrosecurity and Biosecurity
Level 2: Implement a security plan addressing facility needs and tampering points

Indicators
3.12.01 Recognize sources and origins of agents that can contaminate processed and unprocessed food products
3.12.02 Identify activities and biological agents that contribute to the risk of acquiring or preventing a specific disease
3.12.03 Identify sources of biological and chemical tampering points
3.12.04 Assess facility security, classify level of risk and recommend improvements
3.12.05 Assess bio-security practices for sourcing of raw ingredients and recommend improvements
3.12.06 Implement biosecurity procedures to prevent cross-site contamination
3.12.07 Screen and test animals and plant products for infectious agents or contamination
3.12.08 Use biocontainment practices (e.g., quarantine, eradicate) to manage pests and disease vectors

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

Unit: Equipment

Students will perform inspections on stationary and mobile equipment while following the manufacturer's recommended operating procedures and adjustment specifications. Students will be able to identify and

service fuel, air, ignition, charging, cooling, and lubrication systems. Students will also describe health and safety practices to reduce risks from hazardous materials and hazardous materials disasters.

Benchmark: 4.2 Stationary and Mobile Equipment Maintenance
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
4.2.11 Calibrate metering, monitoring, and sensing equipment
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 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)

Benchmark: 4.4 Engines
Level 2: Diagnose and repair components of both small and large internal combustion engines

Indicators
4.4.07 Identify and service/repair fuel/air system components
4.4.08 Identify and service/repair ignition, starting and charging system components
4.4.09 Identify and service/repair cooling system components
4.4.10 Identify and service/repair lubrication system components

Academic Standards

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

Math: Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision. (Measurement E, 8-10)

Science: Explain the movement of objects by applying Newton's three laws of motion. (Physical Sciences D, 9-10)

Benchmark: 5.13 Hazardous Materials Management

Level 2: Follow handling, storage, and recording procedures for hazardous materials

Indicators

5.13.01 Describe health and safety practices to reduce risks from hazardous materials (i.e., MSDS forms, employer notification forms, personal protective equipment)
5.13.02 Demonstrate appropriate responses for major types of hazardous materials disasters (e.g., chemical, fire and explosion, general safety hazards)
5.13.03 Demonstrate an ability to obtain and use information addressing hazardous substance discharge
5.13.04 Demonstrate safe management, handling, disposal and/or recycling procedures for hazardous and regulated materials and hazardous waste
5.13.05 Detect and identify hazardous materials
5.13.06 Perform site evaluation to determine presence and storage of hazardous materials
5.13.07 Retrieve and evaluate hazardous materials and hazardous waste sample data
5.13.08 Prepare hazardous materials for transportation and storage in accordance with regulations
5.13.09 Maintain hazardous material handling documentation
5.13.10 Identify hazardous materials that can be recycled

Academic Standards

English: Apply reading comprehension strategies to understand grade-appropriate text. (Reading Process A, 8-10; Reading Process A, 11-12)

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

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: 3.1 Marketing

Level 2: Develop and market a product or service to maximize profits and optimize cost

Indicators

3.1.01 Select target market and consumers
3.1.02 Research products and service design(s) and determine the technical feasibility of new products
3.1.03 Conduct market research and analysis
3.1.04 Select channels of distribution
3.1.05 Set prices using supply and demand curves and commodity and non-commodity pricing
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

3.1.09 Select and implement a marketing option (e.g., cash sales, hedge, speculate, options, forward contract, government programs)
3.1.10 Identify and evaluate purchase options (e.g., finance options, lease, cash, rental)
3.1.11 Evaluate the benefits of commodity check-off programs

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 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
3.2.07 Utilize suggestive selling and selling up techniques
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 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
3.3.05 Plan operational capacity
3.3.06 Develop a continuous-improvement management program
3.3.07 Establish business relationships
3.3.08 Document business activities
3.3.09 Track performance of business plan
3.3.10 Assess the profitability of a product
3.3.11 Analyze operating results in relation to budget/industry

3.3.12 Perform human-resource management functions (e.g., recruit, select, evaluate, terminate employees)
3.3.13 Identify crisis management techniques

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: 3.4 Finance

Level 2: Analyze fiscal status of an enterprise and reallocate resources to maintain/increase profitability

Indicators

3.4.01 Identify sources of capital and explain considerations in selecting among them
3.4.02 Analyze investment options (e.g., buy, lease, finance, risk)
3.4.03 Evaluate credit uses and options
3.4.04 Evaluate and select banking services
3.4.05 Budget resources (e.g., capital, human, financial, time)
3.4.06 Manage assets for optimum utilization
3.4.07 Manage risk of liabilities
3.4.08 Maintain financial records and interpret and analyze financial statements
3.4.09 Determine cost of doing business (e.g., personnel, depreciation, materials, freight, quality)
3.4.10 Calculate and analyze return on investment (ROI)
3.4.11 Forecast future budgetary needs

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: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Social Studies: Analyze how scarcity of productive resources affects supply, demand, inflation and economic choices. (Economics A, 11-12)

Benchmark: 3.5 Purchasing and Inventory

Level 2: Manage inventory based on budgeting and sales forecasting

Indicators

3.5.01 Explain the nature and scope of purchasing
3.5.02 Manage the bid process in purchasing
3.5.03 Evaluate and select vendors
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
3.5.06 Calculate costs of carrying and not carrying inventory
3.5.07 Determine cost-effective order method and economic reorder point for inventory
3.5.08 Apply just-in-time concepts
3.5.09 Perform logistics management

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 and 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.

Benchmark: 3.6 Information Management
Level 2: Integrate software applications and use multiple software options to create a product, document or presentation

Indicators
3.6.01 Utilize technology to maintain and monitor business records
3.6.02 Conduct research using the Internet
3.6.03 Create and utilize documents using word processors, spreadsheets, databases and electronic mail
3.6.04 Conduct oral/visual presentation using presentation software
3.6.05 Create and post a basic web page
3.6.06 Utilize personal information management/productivity applications
3.6.07 Operate geospatial technological systems (e.g., Global Positioning System [GPS], Geographical Information System [GIS])
3.6.08 Adhere to common security guidelines for technology

Academic Standards
English: Prepare writing for publication that follows an appropriate format and uses a variety of techniques to enhance the final product. (Writing Process F, 11-12)
Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Benchmark: 3.7 Communication Skills
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
3.7.03 Develop and deliver formal and informal presentations
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
3.7.06 Use consensus-building techniques, including parliamentary procedure, to make decisions and compile summary of meeting minutes, conclusions, and next steps
3.7.07 Extract relevant, valid information from materials and cite sources of information
3.7.08 Develop reports and documents that organize information accurately and use formatting techniques for user friendliness
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)

Unit: Business Leadership and Interpersonal 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.

Benchmark: 3.8 Business Leadership

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
3.8.08 Manage time with organizational tools and prioritize objectives, responsibilities and tasks
3.8.09 Apply conflict-resolution skills
3.8.10 Recognize/reward others for their efforts and contributions
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)

Benchmark: 3.9 Emotional Intelligence

Level 2: Exhibit techniques to control emotional reactions to people and situations

Indicators

3.9.01 Conduct an interpersonal and intrapersonal inventory
3.9.02 Identify how individual actions impact others
3.9.03 Manage personal emotions, behavior and appearance to maintain professionalism
3.9.04 Describe and exhibit appropriate ethical behavior
3.9.05 Accept and use constructive feedback to improve work habits
3.9.06 Employ appropriate coping skills to prevent/handle workplace conflicts
3.9.07 Recognize, respect and utilize the diversity among people and cultures
3.9.08 Foster positive working relationships

Academic Standards

English: Use a variety of strategies to enhance listening comprehension. (Communication A, 8-10; Communication A, 11-12)
Social Studies: Analyze how issues may be viewed differently by various cultural groups. (People in Societies A, 11-12)