
ILLINOIS CERTIFICATION TESTING SYSTEM

FIELD 170: AGRICULTURAL EDUCATION TEST FRAMEWORK

November 2003

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FIELD 170: AGRICULTURAL EDUCATION

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Agriculture Education Programs

Animal Science

Plant and Soil Science

Horticulture

Agricultural Resources

Agricultural Mechanics

Agricultural Business

SUBAREA I—AGRICULTURE EDUCATION PROGRAMS

0001 Understand the foundations of work and the career development process.

For example:

- Demonstrate an understanding of the history, organization, and future of work and how work relates to needs and functions of the economy and society.
- Recognize career development concepts and the relationship between work and learning, and apply career planning procedures.
- Identify career areas, career opportunities, and job specialties in agriculture and related fields.
- Demonstrate knowledge of educational and other prerequisites for agricultural occupations and workplace skill requirements.
- Demonstrate an understanding of procedures for securing and maintaining employment in agriculture.
- Identify sources of information related to agriculture and agricultural careers (e.g., Illinois Occupational Skill Standards, journals, the Internet, agricultural professional organizations, career and technical education professional organizations).

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0002 Understand how to develop and implement a comprehensive agriculture education program.

For example:

- Demonstrate knowledge of the factors and steps involved in developing and implementing a comprehensive agriculture program that reflects student, community, and industry interaction (e.g., the effective use of agricultural advisory councils, agricultural literacy programs, partnerships with business and other constituent support groups).
- Identify appropriate references and resources used in agricultural education.
- Demonstrate an understanding of student and industry needs in career and technical education and of strategies for developing effective pre-kindergarten to adult education programs in agriculture.
- Recognize the importance of experiential learning through planned, comprehensive Supervised Agricultural Experiences (SAEs) and identify the characteristics and procedural requirements of effective SAEs (e.g., curriculum and career linked, individualized and student managed, documented using record keeping and analysis).
- Demonstrate knowledge of safe practices related to agricultural education.

0003 Understand the principles of leadership.

For example:

- Demonstrate knowledge of the advisory and supervisory roles of the agricultural education teacher with regard to National FFA Organization activities.
- Identify the role, characteristics, and activities of the FFA in agriculture education programs.
- Recognize procedures related to planning and conducting student, chapter, and community development activities in the FFA.

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0004 Understand the scientific method of investigation.

For example:

- Demonstrate knowledge of processes of scientific inquiry and the scientific method.
- Identify and apply principles of experimental design to test hypotheses in agriculture.
- Apply scientific procedures for gathering, organizing, reporting, and interpreting agricultural data.
- Demonstrate an understanding of the use of models in explaining and investigating agricultural questions.
- Demonstrate familiarity with the use of tools, equipment, and materials used in scientific investigations in agriculture.

SUBAREA II—ANIMAL SCIENCE

0005 Understand domesticated animals and their uses.

For example:

- Recognize characteristics of production and companion animals.
- Identify products derived from domesticated animals, the uses of domesticated animals, and the uses of domesticated animal products in society.
- Demonstrate an understanding of principles and procedures for evaluating production and companion animals.
- Identify and apply procedures used in processing, grading, and packaging domesticated animal products.

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0006 Understand the anatomy and physiology of animals, including the nutritional requirements of domesticated animals.

For example:

- Identify major organs and organ systems, their functions, physiology, and interrelationships in production and companion animals.
- Analyze the relationship of animal anatomy and physiology to the care of domesticated animals (e.g., the relationship of the digestive system to feeding practices).
- Analyze factors that influence nutritional requirements and feed options for domesticated animals.
- Identify the uses of various feeds for specific species and apply procedures for the selection of appropriate feed and feeding schedules.
- Analyze the composition, classification, and nutritional value of various types of feed and recognize symptoms of nutrient deficiencies.
- Identify types, functions, and effects of feed additives.

0007 Understand and apply knowledge of domesticated animal reproduction and genetics.

For example:

- Demonstrate knowledge of reproductive processes.
- Demonstrate an understanding of the basic principles of inheritance and genetics (e.g., Mendelian genetics, function of genes) and their application to selective breeding.
- Describe the processes of meiosis, fertilization, and mitosis.
- Recognize factors involved in selecting breeding stock and identify breeding methods and procedures.
- Analyze factors that influence breeding decisions (e.g., phenotype, genotype, hybrid vigor).
- Identify and apply procedures for the care of animals during pregnancy and parturition.
- Demonstrate an understanding of the application of biotechnology in animal reproduction.

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0008 Understand facilities management and practices for handling domesticated animals and maintaining their health.

For example:

- Identify types and characteristics of facilities, tools, and equipment used to provide or maintain appropriate environments.
- Demonstrate familiarity with procedures for the safe and humane handling of production and companion animals, including methods of castrating, dehorning, branding, marking, ear notching, tagging, tattooing, docking, and medicating animals.
- Analyze types, symptoms, causes, prevention, and treatment of common infectious and noninfectious diseases.
- Demonstrate an understanding of procedures for the ethical management and treatment of animals.

SUBAREA III—PLANT AND SOIL SCIENCE

0009 Understand characteristics, components, and properties of soil.

For example:

- Identify soil components, composition, and characteristics of different types of soil.
- Analyze factors that affect the ability of soil to support plant growth and methods for improving this capacity.
- Recognize symptoms of soil deficiencies, apply procedures for testing soil, and interpret soil test results.
- Analyze the importance of major nutrients to plant growth and the use of fertilizers in plant production.
- Analyze soil management practices, including drainage, irrigation, and conservation.

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0010 Understand plant anatomy and physiology, including plant reproduction and genetics.

For example:

- Identify plant structures, organs, and organ systems and their functions and interactions.
- Demonstrate an understanding of the processes of photosynthesis, respiration, and transpiration.
- Recognize environmental requirements for plant growth and development.
- Recognize the processes of sexual and asexual reproduction in plants.
- Apply principles of plant breeding, hybridization, genetics, and grafting.
- Demonstrate an understanding of the application of biotechnology in plant growth and reproduction.

0011 Understand characteristics and uses of agronomic crops.

For example:

- Recognize types, characteristics, and uses of major agronomic crops, including major grain, hay, and pasture crops grown in Illinois.
- Identify the distribution and growth habits of agronomic crops.
- Identify crop varieties and evaluate market grades of agronomic crops.
- Demonstrate knowledge of crop product processing, including types of crop products, types and quality of product packaging, and principles of quality control.
- Demonstrate an understanding of the uses of agronomic crops through biotechnology.

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0012 Understand methods and procedures for planting, caring for, and harvesting agronomic crops.

For example:

- Analyze environmental requirements for different types of agronomic crops.
- Evaluate types of tillage systems and analyze factors in seed bed preparation, irrigation, planting, and caring for different types of crops.
- Apply procedures for identifying and controlling plant pests, pathogens, and weeds that affect agronomic crops (including integrated pest management methods and procedures for the safe storage, application, and disposal of pesticides).
- Recognize pollutants that are harmful to plants and their symptoms and effects.
- Identify appropriate crop rotation schedules.
- Evaluate methods of harvesting major types of agronomic crops.

SUBAREA IV—HORTICULTURE

0013 Understand characteristics, propagation, and care of fruit and vegetable crops.

For example:

- Identify types, characteristics, and uses of various fruit and vegetable crops.
- Identify environmental factors that affect the growth of fruits and vegetables (e.g., temperature, humidity, wind, hardiness zone).
- Analyze environmental requirements for different types of fruit and vegetable crops.
- Demonstrate an understanding of procedures for seed bed preparation, seeding, propagating, transplanting, hardening, and caring for different types of fruits and vegetables.
- Demonstrate knowledge of procedures for identifying and controlling plant pests, pathogens, and weeds that affect fruits and vegetables (including integrated pest management methods and procedures for the safe storage, application, and disposal of pesticides).
- Demonstrate an understanding of methods of harvesting and processing major types of fruits and vegetables.

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0014 Understand greenhouse and nursery management.

For example:

- Identify types, characteristics, and uses of various types and varieties of plants produced in greenhouses and nurseries.
- Demonstrate knowledge of facilities, tools, and equipment used in greenhouses and nurseries, including methods of regulating the greenhouse and nursery environments.
- Analyze factors that affect the growth of greenhouse and nursery crops (e.g., nutrients, soil, water, light, temperature, and humidity).
- Identify types, components, characteristics, and uses of artificial and soil-based growth media.
- Demonstrate an understanding of procedures for the preparation of growth media, seed bed preparation, seeding, propagating, transplanting, hardening, and caring for greenhouse and nursery plants.
- Demonstrate knowledge of procedures for identifying and controlling plant pests, pathogens, and weeds that affect greenhouse and nursery plants (including integrated pest management methods and procedures for the safe storage, application, and disposal of pesticides).
- Demonstrate an understanding of practices related to the production, preparation, handling, and shipping of plants in greenhouses and nurseries (e.g., forcing, temperature control after harvesting).

0015 Understand and apply principles of landscaping and turf management.

For example:

- Identify basic elements and principles of landscape planning, design, construction, and maintenance.
- Analyze factors that influence design choices and decisions.
- Demonstrate an understanding of landscape design tools and equipment, their uses, and principles of operation.
- Apply procedures for installing, protecting, and caring for shrubs, turf, and other plants used in landscaping.
- Recognize types and characteristics of grasses.
- Demonstrate an understanding of factors that affect the selection of turf (e.g., environmental conditions, projected uses).
- Identify signs and symptoms of common turf pests and diseases and evaluate alternative turf maintenance practices.
- Demonstrate an understanding of landscaping and turf management tools and equipment, their uses, and principles of operation.

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0016 Understand and apply principles of floriculture and floristry.

For example:

- Identify practices related to the production of cut flowers and flowering plants.
- Demonstrate knowledge of the preparation, care, and handling of flowers and recognize signs and symptoms of common flower pests and diseases.
- Identify materials used in floral arrangements.
- Apply elements and principles of floral design.

SUBAREA V—AGRICULTURAL RESOURCES

0017 Understand relationships among agriculture, the environment, and society.

For example:

- Recognize the importance of different types of renewable and nonrenewable natural resources (e.g., soil, water, forests, wildlife) and problems associated with depletion of natural resources.
- Analyze how various agricultural practices affect the environment (e.g., pollution of ground and surface water by fertilizer, animal wastes, and pesticides; increase in soil salinity due to irrigation; soil erosion).
- Demonstrate knowledge of methods of soil and water conservation in agriculture.
- Evaluate economic factors that affect environmental practices in agriculture.

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0018 Understand the role of forest and agricultural management in protecting habitats and species.

For example:

- Demonstrate an understanding of the ecological concepts of niche, community, and ecosystem.
- Recognize the dependence of wildlife species on specific habitats and identify the effects of forestry and agricultural practices in preserving or altering wildlife habitats.
- Evaluate the benefits and liabilities of nondomesticated species for agricultural operations.
- Apply methods of conserving plants, forests, wildlife, and their habitats.
- Analyze current issues related to protection of wildlife and wildlife habitats (e.g., minimum habitat size required by different species, effects of increasing crop diversity, genetically-altered crop varieties).

0019 Understand issues of land and water use, including principles of land classification and management.

For example:

- Identify different types of land use in Illinois and the United States and analyze the loss of farm land to non-farm uses.
- Demonstrate an understanding of principles of land classification and land-management planning, including multiple-use land management.
- Identify causes and characteristics of various kinds of erosion and evaluate strategies and procedures for controlling soil erosion.
- Analyze issues involving available reserves and usage patterns of land and water (e.g., effects of diversion of water for agricultural and non-agricultural purposes).
- Demonstrate an understanding of the role of government agencies and public service organizations in land and water management.

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SUBAREA VI—AGRICULTURAL MECHANICS

0020 Understand the uses, principles of operation, and maintenance of agricultural machinery and technology.

For example:

- Demonstrate knowledge of the principles and concepts of power and equipment in agricultural applications.
- Identify the types, characteristics, uses, and components of agricultural machinery and technology.
- Demonstrate knowledge of maintenance procedures for small engines and power equipment.
- Analyze common problems and demonstrate familiarity with procedures for troubleshooting, diagnosing, and repairing agricultural machinery and technology.
- Apply knowledge of safety procedures when working with agricultural machinery and technology.

0021 Understand procedures related to agricultural surveying.

For example:

- Recognize basic principles of surveying, types and uses of surveying equipment, and applications of surveying to agriculture.
- Demonstrate knowledge of reading and evaluating legal land descriptions.
- Perform mathematical calculations related to measurement and surveying.

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0022 Understand agricultural structures and construction processes.

For example:

- Demonstrate an understanding of basic principles and techniques of woodworking and carpentry, masonry, plumbing, electricity, and welding (e.g., types and characteristics of materials, material and tool selection for various applications, specific skills related to various types of construction).
- Identify operating principles related to tools and equipment used in agricultural construction.
- Apply techniques used to design, construct, repair, and maintain physical structures in agricultural operations.
- Identify safety issues related to construction and apply knowledge of safe operating principles of tools and equipment used in agricultural construction.

SUBAREA VII—AGRICULTURAL BUSINESS

0023 Understand the application of economic principles to agricultural business, including the role of government economic policies.

For example:

- Apply economic principles (e.g., supply and demand, diminishing returns, competitive advantage, resource substitution) to agricultural business.
- Analyze factors (e.g., production costs, labor availability, interest rates, capital investment) that affect profit and loss in various agricultural operations.
- Recognize the importance of international trade and interstate commerce to agricultural businesses in Illinois, including the role played by federal and state trade policies.
- Identify agricultural products commonly imported and exported and assess the economic impact of leading commodities.
- Identify the role of federal and state agencies in regulating agricultural business practices and analyze the effects of government economic policies (e.g., crop subsidies, government-secured loans, tax policies) on agricultural businesses in Illinois.

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0024 Understand financial management and decision making in agricultural business.

For example:

- Apply basic accounting and record-keeping procedures to agricultural operations.
- Demonstrate familiarity with standard banking procedures and assess the types, sources, and costs of credit in agricultural business.
- Evaluate types of insurance (e.g., life, health, accident, business, employment) and their benefits.
- Analyze factors that affect decisions about financial planning and management in agricultural business.
- Demonstrate knowledge of methods of cost-benefit analysis and risk assessment in agricultural business.

0025 Understand agricultural business management practices.

For example:

- Identify types of agricultural businesses and forms of business ownership and their characteristics.
- Analyze principles of entrepreneurship and the role and importance of entrepreneurs in agricultural business.
- Apply procedures for budgeting, scheduling, forecasting market conditions, calculating production costs, and supervising personnel.
- Demonstrate knowledge of state and federal regulations governing agricultural business practices (e.g., regulations relating to safety, animal welfare, environmental protection).
- Describe the role of computer technology in agricultural business operations (e.g., common applications of computer technology in agriculture, types and characteristics of computer hardware and software used in agricultural businesses).

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0026 Understand principles related to purchasing, marketing, and merchandising in agricultural business.

For example:

- Analyze factors involved in making purchasing decisions.
- Identify characteristics of various types of market outlets and apply strategies for pricing and marketing agricultural products (e.g., hedging, futures, forward contracting, options, cash markets).
- Demonstrate familiarity with types, uses, and costs of advertising and with design and merchandising strategies for product display.
- Apply strategies for effective sales and service in agricultural applications.
- Evaluate the role of government agencies, programs, and regulations (e.g., labeling requirements) in agricultural marketing.