# CERTIFICATION EXAMINATIONS FOR OKLAHOMA EDUCATORS™ (CEOE™)

## OKLAHOMA SUBJECT AREA TESTS™ (OSAT™)

## FIELD 042: AGRICULTURAL EDUCATION
## TEST FRAMEWORK

**September 2010**

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# TEST FRAMEWORK

I. Agricultural Business, Economics, and Marketing
II. Animal Science
III. Plant and Soil Science
IV. Agricultural Mechanics
V. Environmental Science and Natural Resources
VI. Foundations of Agricultural Education

## SUBAREA I—AGRICULTURAL BUSINESS, ECONOMICS, AND MARKETING

### Competency 0001

**Understand agricultural business ownership and management.**

*The following topics are examples of content that may be covered under this competency.*

- Identify business management functions (e.g., planning, controlling) and types (e.g., sole proprietorship, corporation, cooperative) and characteristics of business ownership.
- Identify principles of financial planning and management; basic banking procedures; and the types, sources, and costs of credit.
- Apply principles and procedures, including the use of technology, for accounting, record keeping, and office and information management in agricultural business contexts.
- Identify types and characteristics of insurance and other forms of risk management (e.g., hedging, diversification).
- Apply knowledge of human resources management in agricultural business contexts.
- Describe the role of entrepreneurs in agriculture and procedures for establishing a successful agricultural business.
- Analyze ethical issues in agriculture and agencies, laws, and regulations affecting agricultural businesses.

**Competency 0002**

**Understand agricultural economic principles and policies.**

*The following topics are examples of content that may be covered under this competency.*

- Define basic economic principles (e.g., risk, supply and demand, comparative advantage, diminishing returns, opportunity cost) and their application to agricultural businesses.
- Compare basic types of competitive systems and market structures (e.g., oligopoly, monopoly), their characteristics, and their importance in agricultural industries.
- Describe how factors in the U.S. economy (e.g., recession, unemployment, inflation) affect agricultural businesses.
- Describe how U.S. trade policies and international agreements affect agricultural businesses in Oklahoma and the United States.
- Identify types and characteristics of Oklahoma's major agricultural products and their role in the U.S. economy.

**Competency 0003**

**Understand agricultural marketing.**

*The following topics are examples of content that may be covered under this competency.*

- Describe strategies for marketing agricultural products (e.g., assessing marketing information, identifying target markets, developing marketing plans).
- Analyze factors that affect pricing decisions for agricultural products (e.g., production costs, competition).
- Identify distribution systems for agricultural products (e.g., types and characteristics of distribution channels).
- Analyze strategies for promotion and sale of agricultural products (e.g., advertising campaigns, sales techniques).
- Identify laws and regulations affecting the marketing of agricultural products (e.g., product labeling laws, truth-in-advertising laws).

## SUBAREA II—ANIMAL SCIENCE

### Competency 0004

**Understand animal anatomy, physiology, reproduction, and genetics.**

*The following topics are examples of content that may be covered under this competency.*

- Identify basic characteristics and uses of various species and breeds of domestic animals.
- Analyze principles for evaluating and selecting animals for various production systems.
- Identify growth processes and stages (e.g., cow/calf, stocker, feed lot) in domestic animals.
- Describe relationships between the anatomy and physiology of domestic animals and compare the structure, function, and interrelationships of various organ systems.
- Describe basic principles of animal reproduction and their application to breeding practices and the care of animals during pregnancy and parturition.
- Interpret basic principles of inheritance, genetics, and selective breeding of animals.
- Identify basic principles of biotechnology in animal production.

### Competency 0005

**Describe characteristics of animal nutrition and health.**

*The following topics are examples of content that may be covered under this competency.*

- Describe nutrient functions, nutritional requirements, sources of nutrients, and common deficiency symptoms in domestic animals.
- Compare animal feeding practices and the composition, classification, and nutritional value of feeds and feed additives.
- Describe factors (e.g., stage of development, pregnancy, lactation, environmental conditions) that influence nutritional requirements and decisions about feeding practices.
- Identify types, causes, and symptoms of common infectious and noninfectious diseases of domestic animals and methods for their prevention, treatment, and control.
- Identify types, symptoms, and life cycles of common external and internal parasites of domestic animals and methods for their prevention, treatment, and control.

**Competency 0006**

**Understand animal production systems and safe handling of animals and their products.**

*The following topics are examples of content that may be covered under this competency.*

- Identify common procedures used in animal production systems (e.g., castrating, dehorning, marking, medicating) and safe and humane practices for handling animals.
- Analyze environmental requirements (e.g., range requirements, temperature control) for various types of domestic animals.
- Identify traditional and alternative animal production systems; types, characteristics, and purposes of animal facilities; and common issues related to managing these facilities.
- Assess negative environmental effects associated with animal production systems (e.g., water pollution, overgrazing) and strategies for minimizing these effects.
- Describe public concerns about humane treatment of animals and legal and ethical issues relating to animal welfare.
- Identify principles and procedures for the safe handling, processing, preserving, storing, grading, and inspecting of animal products.

## SUBAREA III—PLANT AND SOIL SCIENCE

### Competency 0007

**Identify principles of soil science.**

*The following topics are examples of content that may be covered under this competency.*

- Identify processes of soil formation, soil classification, and soil components (e.g., humus, sand, clay).
- Identify properties of soil (e.g., texture, particle size, structure, porosity), characteristics of different types of soil, and how these characteristics affect plant growth.
- Analyze procedures for performing and interpreting basic soil tests.
- Analyze the suitability of different types of soil for various crops.
- Identify characteristics and uses of different types and formulations of fertilizers and soil amendments.
- Identify various types of soil management and conservation practices (e.g., no-till, crop rotation, cover cropping, drainage).

### Competency 0008

**Understand plant anatomy, physiology, reproduction, and genetics.**

*The following topics are examples of content that may be covered under this competency.*

- Identify plant classification and characteristics of major plant groups (e.g., monocots, eudicots).
- Describe structures and functions of cells, tissues, and systems of plants and physiological processes in plants (e.g., photosynthesis, transport).
- Analyze factors affecting plant growth and maturation (e.g., the action of various hormones on growth and ripening) and requirements for growth of plants.
- Compare methods and techniques of asexual and sexual plant propagation (e.g., seeds, division, micropropagation).
- Interpret basic principles of inheritance, genetics, selective breeding, and hybridization of plants.
- Identify basic principles of biotechnology in plant production.

**Competency 0009**

**Describe characteristics of plant nutrition and disease.**

*The following topics are examples of content that may be covered under this competency.*

- Describe nutrient functions, nutritional requirements, sources of nutrients, and common deficiency symptoms in plants.
- Describe nutritional needs and feeding strategies for different species of plants and for plants at different stages of maturity.
- Identify types, causes, and symptoms of common diseases of plants and methods for their prevention, treatment, and control.
- Identify types, characteristics, signs of damage, and life cycles of common plant pests and methods (e.g., chemical pesticides, integrated pest management) for their prevention, treatment, and control.
- Identify types and characteristics of common weed pests and methods (e.g., herbicides, tillage) for their control.
- Describe safe handling, storage, and disposal of agricultural chemicals (e.g., fertilizers, herbicides, pesticides).

**Competency 0010**

**Identify characteristics of production systems for agronomic crops, horticultural crops, and rangelands.**

*The following topics are examples of content that may be covered under this competency.*

- Identify species, varieties, characteristics, and uses of agriculturally important plants and alternative crops grown in Oklahoma.
- Identify practices for scheduling, planting, fertilizing, irrigating, and harvesting crops grown in Oklahoma.
- Describe principles and procedures for safe handling of plant products and for processing, preserving, storing, grading, and inspecting plant products.
- Describe principles and methods of rangeland management.
- Identify types and characteristics of facilities, materials, tools, and growth media used in greenhouse and nursery production systems.
- Identify methods for scheduling, planting, fertilizing, watering, propagating, and harvesting greenhouse and nursery crops.
- Apply principles of landscape design and methods of landscape management.
- Apply principles of precision farming and the use of advanced technologies in plant production systems (e.g., remote sensing, Variable Rate Technology, laser-guided tillage, GPS, computer-based water and temperature controls).

## SUBAREA IV—AGRICULTURAL MECHANICS

### Competency 0011

**Understand safe and appropriate use of power equipment and small engines.**

*The following topics are examples of content that may be covered under this competency.*

- Describe basic principles and concepts relating to the operation of power equipment and internal combustion engines.
- Identify components of small engines and types, characteristics, and uses of power equipment employed in agricultural production.
- Apply principles and procedures for maintaining, troubleshooting, and repairing small engines employed in agricultural production.
- Apply practices for the safe use of power equipment in agricultural production.
- Identify types, characteristics, components, operating principles, and uses of electrical and hydraulic systems used in agricultural equipment.

### Competency 0012

**Understand safe wood and metal fabrication, agricultural construction, and irrigation systems.**

*The following topics are examples of content that may be covered under this competency.*

- Apply planning, drafting, measurement, and mathematical skills to agricultural wood and metal fabrication and construction.
- Identify types, properties, and uses of materials used in wood and metal fabrication and how to safely perform basic woodworking and metalworking procedures.
- Apply construction principles (e.g., carpentry, concrete, finishing skills) and knowledge of types, characteristics, and uses of materials and tools used in agricultural construction.
- Identify principles and applications of electrical power and plumbing and apply skills, methods, tools, and materials for the installation and maintenance of electrical and plumbing systems in agricultural construction.
- Identify types, characteristics, components, and uses of water control and irrigation systems.
- Identify basic principles, methods, tools, and equipment for surveying, mapping, land measurement, and land leveling.

## SUBAREA V—ENVIRONMENTAL SCIENCE AND NATURAL RESOURCES

### Competency 0013

**Understand ecological principles and the relationship between agriculture and the environment.**

*The following topics are examples of content that may be covered under this competency.*

- Define basic ecological principles (e.g., niche, ecosystem, ecological succession) and their application to agriculture.
- Describe energy, water, and nutrient cycles and their relevance to agriculture.
- Identify effects of different types of agricultural production systems on the environment (e.g., habitat improvement, erosion, loss of biodiversity).
- Apply principles and methods for minimizing and mitigating environmental degradation due to agricultural production.
- Analyze social, legal, and ethical issues (e.g., stewardship, landowner property rights) related to agriculture and the environment.

### Competency 0014

**Understand natural resources conservation and management.**

*The following topics are examples of content that may be covered under this competency.*

- Identify types and characteristics of renewable and nonrenewable natural resources.
- Compare types, characteristics, advantages, and disadvantages of alternative energy sources (e.g., wind, solar, geothermal).
- Describe principles and methods of sustainable agriculture and the sustainable use of natural resources.
- Identify principles and methods for soil (e.g., topsoil, subsoil) and water (e.g., ground, surface) conservation and management.
- Assess causes of habitat loss and reduction of biodiversity, strategies for conserving and replacing habitat, and principles of wildlife management.
- Identify principles and methods of forest management (e.g., timber management, multiple-use management) and outdoor recreational management.

## SUBAREA VI—FOUNDATIONS OF AGRICULTURAL EDUCATION

### Competency 0015

**Understand foundations of agriculture and agricultural education.**

*The following topics are examples of content that may be covered under this competency.*

- Describe the scope and importance of the agricultural industry.
- Identify important events and individuals in the history of agriculture, agricultural education, and FFA.
- Identify social, economic, and political issues that affect agricultural education.
- Apply scientific methods and principles in agriculture.
- Describe the comprehensive program model in agricultural education and the relationship among classroom and laboratory learning, Supervised Agricultural Experiences (SAEs), and participation in FFA.
- Describe professional development and outreach in agricultural education, including strategies for working with advisory committees, and local, state, and national stakeholders, including members of the school and local community.
- Identify potential hazards in the classroom, laboratory, field, and SAE; sources of safety information; and procedures for the safe use, storage, and disposal of hazardous materials.
- Identify occupational safety practices in agriculture and apply this knowledge to ensuring the safety of all students in the classroom, laboratory, field, and SAE.

**Competency 0016**

**Identify communication and leadership skills in agriculture and agricultural education.**

*The following topics are examples of content that may be covered under this competency.*

- Describe principles of effective oral and written communication skills.
- Apply skills for fostering teamwork, motivation, and leadership among students.
- Identify the purposes and goals of FFA (e.g., assisting students in developing leadership, communication, citizenship, and competitive skills).
- Describe the organizational structure of FFA, roles of officers in an FFA chapter, and the rules of basic parliamentary procedure.
- Identify effective strategies for developing a Program of Activities (POA) for an FFA chapter and for facilitating student participation in FFA events and awards at the local, state, and national levels.
- Identify the roles and responsibilities of FFA advisors in ensuring the success of an FFA chapter.

**Competency 0017**

**Understand careers in agriculture and career development.**

*The following topics are examples of content that may be covered under this competency.*

- Identify workplace skills and personal characteristics necessary for a successful career in agriculture-related fields.
- Identify careers in agriculture-related fields and the knowledge, skills, and requirements necessary for success in those careers.
- Apply knowledge of strategies and skills for job search and career development (e.g., locating job opportunities, creating a résumé, interviewing for a job).
- Identify goals and purposes of Supervised Agricultural Experiences (SAEs) and characteristics of different types of SAEs.
- Apply strategies for coordinating a variety of SAEs and for assisting students in planning, selecting, and managing their SAEs.