Field 009: Career and Technical Education—Agriculture
Assessment Blueprint

Domain I—Agribusiness

0001 Agricultural Business, Economics, Finance, and Marketing (Standard 1)

Domain II—Animal Science

0002 Animal Science (Standard 2)

Domain III—Plant and Soil Science

0003 Plant and Soil Science (Standard 3)

Domain IV—Food Science, Genetics, and Biotechnology

0004 Food Science (Standard 4)

0005 Genetics and Biotechnology (Standard 5)

Domain V—Agricultural Mechanics and Technology

0006 Agricultural Mechanics, Engineering, Construction, and Technology (Standard 6)

Domain VI—Environment and Natural Resources

0007 Environmental Science and Natural Resources Management (Standard 7)

Domain VII—Agricultural Education

0008 Core Knowledge and Skills for Agriculture Teachers (Standard 8)

0009 Agricultural Education Program (Standard 9)

0010 Agriculture Instruction and Assessment (Standard 10)

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	Domain	Objectives	Standards	Approximate Test Weight
I.	Agribusiness	0001	1	10%
II.	Animal Science	0002	2	15%
III.	Plant and Soil Science	0003	3	15%
IV.	Food Science, Genetics, and Biotechnology	0004–0005	4–5	20%
V.	Agricultural Mechanics and Technology	0006	6	10%
VI.	Environment and Natural Resources	0007	7	10%
VII.	Agricultural Education	0008–0010	8–10	20%

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Standard 1: Agricultural Business, Economics, Finance, and Marketing

Agriculture teachers have a broad and comprehensive understanding of agricultural business, economics, finance, and marketing, including:

1.1 principles of agribusiness and farm business management functions, roles, duties, and skills, including leadership, organizational, time management, and teamwork skills

1.2 characteristics of different types of agricultural business ownership, including sole proprietorships, partnerships, corporations, and cooperatives; advantages and disadvantages of business ownership; and procedures for starting an agricultural business

1.3 strategies and skills for effective oral and written workplace communication and collaboration and for using effective strategies and current available technology for locating, interpreting, and evaluating information from a variety of sources

1.4 economic principles and concepts, including supply and demand, opportunity costs, and diminishing returns, and their application to agricultural business

1.5 strategies used in agricultural production planning, including methods of forecasting, and cost analysis

1.6 principles and methods for developing, distributing, pricing, and promoting agricultural products; conducting market research; identifying target markets; and selling agricultural products to customers

1.7 concepts, principles, skills, and economic issues related to global marketing of agricultural products

1.8 principles of financial and risk management in agricultural business, including basic banking procedures and the types, sources, and costs of credit and insurance

1.9 procedures and practices for accounting, record keeping, and information management in agricultural business, including the use of computer technology and computer software

1.10 current and ethical issues in agriculture and government agencies, laws, and policies affecting agricultural business

1.11 career opportunities in agricultural business, marketing, and related fields and knowledge and skills, including leadership skills, required for employment in these fields

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Standard 2: Animal Science

Agriculture teachers have a broad and comprehensive understanding of animal science, including:

2.1 animal classification, characteristics and uses of various species and breeds of domestic animals, and principles for evaluating and selecting animals in production systems

2.2 structure and function of cells, tissues, and organ systems of animals; physiological processes in animals; and the relationship between the anatomy and physiology of domestic animals and their care

2.3 animal reproductive biology and its application to breeding practices and the care of animals during pregnancy and parturition

2.4 animal nutrition, including nutrient chemistry, functions, sources, and requirements; feed types and composition; and animal feeding practices

2.5 types, causes, and symptoms of common diseases and parasites that affect animals and methods for their prevention, treatment, and control

2.6 principles and practices for caring for, safely handling, housing, and maintaining animals

2.7 effects of animal production systems on the environment and strategies and practices for minimizing environmental damage and sustaining the environment

2.8 principles and practices used in aquaculture and production systems of nontraditional animals

2.9 current events and issues affecting animal science and animal production industries

2.10 career opportunities in animal science, animal production, and related fields and knowledge and skills, including leadership skills, required for employment in these fields

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Standard 3: Plant and Soil Science

Agriculture teachers have a broad and comprehensive understanding of plant and soil science, including:

3.1 plant classification and characteristics and uses of various species and varieties of agronomic, turf, and horticultural plants

3.2 structure and function of cells, tissues, and systems of plants and physiological processes in plants, including photosynthesis, respiration, transpiration, and transport

3.3 asexual and sexual reproduction in plants, methods and techniques of plant propagation, and factors affecting plant growth and maturation

3.4 plant nutrition, including nutrient functions, nutrient sources, and common deficiency symptoms; soil-testing chemistry and procedures; and types and formulations of fertilizer

3.5 types, causes, and symptoms of common diseases and pests that affect crop and horticultural plants and methods for their prevention, treatment, and control

3.6 practices and procedures for producing and managing field crops, including scheduling, planting, fertilizing, irrigating, and harvesting crops

3.7 classification, characteristics, components, and properties of soil; effects of crop production on soil; and methods of soil conservation and management

3.8 types and characteristics of facilities, materials, and growth media used in greenhouse, hydroponic, and nursery production and methods for producing and managing horticultural crops

3.9 principles and methods related to floriculture and floral design, landscape design and management, establishment and management of urban gardens and green areas, and the production of interiorscapes

3.10 practices for safe handling of hazardous materials and safe use of equipment used in plant production

3.11 current domestic and international events and issues affecting plant science and crop production

3.12 career opportunities in plant and soil science, plant production, landscape design and management, and related fields and knowledge and skills, including leadership skills, required for employment in these fields

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Standard 4: Food Science

Agriculture teachers have a broad and comprehensive understanding of food science, including:

4.1 consumer concerns about food safety, strategies for risk assessment with respect to food, and procedures for consumer education about food safety

4.2 types of microbes commonly responsible for contamination of food products, sources of contamination, and effects of consumers ingesting contaminated food

4.3 types of hazardous substances, such as heavy metals and pesticide residues, commonly found in food products; sources of these substances; and effects of consumers ingesting these substances with food

4.4 practices for ensuring food safety in producing, processing, handling, and distributing food, including the application of quality-assurance procedures, Good Manufacturing Processes (GMP), and Hazard Analysis & Critical Control Points (HACCP)

4.5 chemical and physical properties of food, composition and nutritional value of various foods and food groups, and essential nutrients in the human diet

4.6 procedures for evaluating, grading, and classifying meat, egg, dairy, grain, fruit, and vegetable food products

4.7 types, characteristics, and purposes of food additives and methods for processing, preserving, storing, and packaging food products

4.8 government agencies, laws, regulations, and policies relating to food quality, food safety, and product labeling

4.9 current events and issues affecting food science and food science industries, including issues surrounding the biochemistry and nutritional content of foods and their effect on domestic and international markets

4.10 career opportunities in food science and related fields and knowledge and skills, including leadership skills, required for employment in these fields

Standard 5: Genetics and Biotechnology

Agriculture teachers have a broad and comprehensive understanding of genetics and biotechnology, including:

5.1 processes of meiosis and mitosis and the structure and function of genes, chromosomes, and DNA and RNA molecules

5.2 principles of Mendelian genetics and inheritance and the application of these principles to selective breeding and hybridization of plants and animals

5.3 processes that affect genotype and phenotype frequencies in populations, including genetic recombination, genetic drift, mutation, and natural selection

5.4 history of biotechnology; social, political, environmental, regulatory, and ethical issues in biotechnology; and issues surrounding conducting and reporting biotechnological research

5.5 techniques and procedures used in biotechnology and genetic engineering, including electrophoresis, gene sequencing, cloning, gene cutting and splicing, identifying marker genes, and DNA recombination

5.6 applications of biotechnology and genetic engineering to improve agricultural products, produce large quantities of hormones or other substances, and increase the efficiency of agricultural production systems

5.7 applications of biotechnology and genetic engineering to treat chemical or industrial waste and clean up environmental contaminants

5.8 current events and issues affecting biotechnology and genetic engineering

5.9 career opportunities in biotechnology and related fields and knowledge and skills, including leadership skills, required for employment in these fields

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Standard 6: Agricultural Mechanics, Engineering, Construction, and Technology

Agriculture teachers have a broad and comprehensive understanding of agricultural mechanics, engineering, construction, and technology, including:

6.1 principles of engineering, science, mathematics, and physics and their application to agricultural mechanics and technology

6.2 types, characteristics, components, and uses of mechanical equipment, small engines, and power systems

6.3 principles, tools, and methods for servicing, maintaining, and repairing mechanical equipment, small engines, and power systems

6.4 principles, tools, and techniques used in the fabrication of wood, metal, and other materials

6.5 construction principles, tools, and materials; and basic carpentry, finishing, plumbing, and electrical skills related to planning, constructing, and maintaining agricultural structures

6.6 types, characteristics, advantages, and disadvantages of alternative energy sources and principles, designs, and components of alternative energy systems

6.7 safe practices for the use of tools and equipment in agricultural mechanics, engineering, and construction

6.8 principles, designs, and components of water control and irrigation systems and principles, methods, and equipment, including GPS and other technology, for surveying, mapping, land measurement, and land leveling

6.9 current technologies and computer software, including GPS, geospatial, remote sensing systems, and other precision technologies, used in agricultural production systems

6.10 current events and issues affecting agricultural mechanics, engineering, construction, and technology

6.11 career opportunities in agricultural mechanics, engineering, construction, technology, and related fields and knowledge and skills, including leadership skills, required for employment in these fields

Standard 7: Environmental Science and Natural Resources Management

Agriculture teachers have a broad and comprehensive understanding of environmental science and natural resources management, including:

7.1 basic ecological principles, including niche, ecosystem, and succession and their application to agriculture

7.2 energy, water, and nutrient cycles and their relevance to agriculture

7.3 effects of monoculture, sustainable agriculture, organic farming, and other agricultural production systems on the environment

7.4 types, characteristics, and uses of renewable and nonrenewable natural resources and principles and methods for their conservation and sustainable management

7.5 causes of habitat loss and reduction of biodiversity, strategies for conserving and replacing habitat, and principles of wildlife and fisheries management

7.6 multiple-use and recreational land management and principles, practices, and tools used in forestry

7.7 social and ethical issues and government agencies, laws, and policies related to environmental degradation and natural resources management

7.8 practices for safe handling of hazardous materials and ensuring safety in the field

7.9 current events and issues affecting environmental science, natural resources use, and sustainable resource management

7.10 career opportunities in environmental science, natural resources management, and related fields and knowledge and skills, including leadership skills, required for employment in these fields

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Standard 8: Core Knowledge and Skills for Agriculture Teachers

Agriculture teachers have a broad and comprehensive understanding of core knowledge and skills for agriculture teachers, including:

8.1 structure and delivery of career and technical education in the United States and Indiana and state and federal laws and regulations pertaining to career and technical education

8.2 Common Core Standards for English Language Arts and Mathematics and their application in agricultural education settings

8.3 interdisciplinary strategies, scientific processes and methods, and procedures used in laboratory and fieldwork investigations in the advanced life sciences

8.4 important events and developments in the history of agriculture, career and technical education, and agricultural education

8.5 social, political, legal, and ethical issues in agricultural education and current trends in agriculture-related fields

8.6 scientific methods and principles and their application in teaching agriculture

8.7 principles and practices for ensuring the safety of students in the classroom, field, laboratory, and supervised agricultural experiences (SAEs)

8.8 personal characteristics and professional skills necessary for success in the workplace

8.9 strategies and techniques for helping students analyze career pathways and carry out self-assessment, self-improvement, career exploration, and career planning and for encouraging students to be lifelong learners

8.10 outreach in agricultural education, including strategies for working with local advisory committees and promoting agricultural literacy and agricultural education opportunities in the community

8.11 strategies for professional development through participation in professional organizations in agriculture and agricultural education, including the National Association of Agricultural Educators (NAAE)

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Standard 9: Agricultural Education Program

Agriculture teachers have a broad and comprehensive understanding of the three-part agricultural education program model, including:

9.1 elements of the three-part agricultural education program model and how these elements complement each other to provide a total program approach to agricultural education

9.2 relationships among classroom and laboratory learning, supervised agricultural experiences (SAEs), and active participation in FFA

9.3 elements of a comprehensive agricultural education program, including community involvement, and systems for program evaluation, school financing and budgeting, and creative program funding

9.4 goals and purposes of SAEs and characteristics of different types of SAEs

9.5 strategies and procedures for assisting students in planning and selecting SAEs and for creating SAE opportunities by establishing and maintaining partnerships with local businesses and community members

9.6 strategies and procedures for coordinating and supervising students' SAEs and for assessing student learning during their SAEs

9.7 purposes and goals of the National FFA Organization and the role of local FFA chapters in helping students develop leadership, communication, citizenship, teamwork, and competitive skills

9.8 organizational structures of local, state, and national FFA and the roles and responsibilities of student officers in a local FFA chapter

9.9 strategies for assisting students in developing a Program of Activities for an FFA chapter and for facilitating students' participation in FFA competitive events at the state and national levels

9.10 roles and responsibilities of FFA advisors in helping ensure the success of an FFA chapter

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Standard 10: Agriculture Instruction and Assessment

Agriculture teachers have a broad and comprehensive understanding of instruction and assessment in career and technical education and agricultural education, including:

10.1 Indiana Academic Standards for Agriculture Education

10.2 instructional strategies and resources for integrating instruction that promotes students' achievement of Common Core Standards for English Language Arts and Mathematics

10.3 strategies and resources for integrating Science, Mathematics, Engineering, and Technology (STEM) instruction; Curriculum for Agriscience Education (CASE); and Advanced Life Science standards into agricultural instruction

10.4 instructional strategies and resources, including inquiry-based, problem-based, and project-based instruction, and the application of these methods in teaching agriculture and advanced life sciences

10.5 strategies and skills for planning, designing, and delivering instruction in agricultural education, including the use of techniques and approaches that meet the needs of diverse learners

10.6 instructional strategies for promoting student learning and fostering the development of critical-thinking, higher-order thinking, problem-solving, and performance skills in agricultural education

10.7 strategies and skills for creating a productive learning environment using knowledge of student behavior, organizational skills, and classroom management skills

10.8 communication methods that promote student learning and foster active inquiry, interaction, and collaboration in the agricultural education classroom

10.9 strategies and skills for selecting, adapting, and using technological resources to enhance teaching and learning about agriculture

10.10 strategies for promoting students' skills and knowledge required for future success in the workplace, in agricultural occupations, and in postsecondary education

10.11 strategies and skills for effectively assessing students' understanding and mastery of essential concepts and skills in agricultural education

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