
North Dakota Agriscience

Content Standards

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North Dakota Department of Career and Technical Education

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The North Dakota State Board for Career and Technical Education has reviewed this standards document, approved the content, and officially adopted the material until 2010.

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Agriscience
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**North Dakota
Agriscience Standards**

Introduction

The North Dakota Department of Career and Technical Education is committed to working on standards to ensure that each program area can offer courses that allow students to acquire knowledge and skills. CTE not only provides technical skills and knowledge for students to succeed in careers, but also cross-functional workplace skills such as teamwork, problem solving, and the ability to find and use information, and provides the context in which traditional educational goals and academic skills can be enhanced.

The standards process is one that directly involves the state supervisor(s), the curriculum administrator for this agency, and teachers working directly with the content at hand. Once the standards are written and expectations are clearly defined, the standards are then compared and aligned with national and industry standards.

The Department of Career and Technical Education strongly believes in the importance of academic integration within each program area. The standards produced for each program area will be cross walked with the most current academic drafts of English Language Arts, Mathematics, and Science. When possible, standards will be cross walked with other academic areas that correspond.



Definitions

For each standard, there is one or more topic statements along with competencies for each topic. The competencies are categorized into three divisions: Introductory, Core, and Advanced. These divisions can further be defined as:

Introductory:	Knowledge Acquisition—Learners at this level expand awareness and build comprehension of knowledge.
Core:	Application—Learners at this level experience acquired knowledge by applying it to situations and self.
Advanced:	Reflection—Learners at this level analyze, synthesize, judge, assess, and evaluate knowledge in accord with their own goals, values, and beliefs, and/or real situations.





Overview of Standards



Standards at a Glance

COMPREHENSIVE STANDARDS

- 1.0 AGRISCIENCE RELATED ISSUES
 - Understand current issues related to agriscience.
- 2.0 PRINCIPLES OF AGRISCIENCE
 - Explore the basic principles of animal science, plant science, food science, biotechnology, energy and power, agribusiness, and natural resources.



Standards with Topics

CONTENT STANDARDS

1.0 AGRISCIENCE RELATED ISSUES

- Understand current issues related to agriscience.
 - 1.1 Recognize the importance of agriscience technology.
 - 1.2 Explore career opportunities in agriscience.
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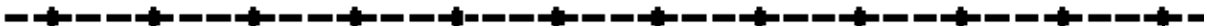
2.0 PRINCIPLES OF AGRISCIENCES

- Explore the basic principles of animal science, plant science, food science, biotechnology, energy and power, agribusiness, and natural resources.
 - 2.1 Validate application of technological principles to the identification, growth, and reproduction of animals.
 - 2.2 Validate application of technological principles to the identification, growth, and reproduction of plants.
 - 2.3 Analyze the production, harvesting, and processing of agriscience products.
 - 2.4 Interpret the relationship between natural resources and agriculture.
 - 2.5 Validate application of mechanization principles to agricultural energy and power systems.
 - 2.6 Describe principles of agribusiness management related to agriscience.
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Agriscience State Standards



Standard 1: AGRISCIENCE RELATED ISSUES – Understand current issues related to agriscience.

Topic 1: Recognize the importance of agriscience technology.

Student Competencies

Introductory

- 1.1.1 Define agriscience technology.
- 1.1.2 Describe the role of agriscience in ND and world agriculture.
- 1.1.3 Identify the major sciences related to agriculture.
- 1.1.4 Use the scientific method.
- 1.1.5 Demonstrate proper use of a microscope.

Core

- 1.1.6 Determine the relationship between agriscience technology and agriculture.
- 1.1.7 Explain bio-security.
- 1.1.8 Investigate biotechnology applications such as tissue culture, cloning and electrophoresis.
- 1.1.9 Submit a report on an agriscience topic.
- 1.1.10 Solve mathematical problems associated with agriscience issues.
- 1.1.11 Discuss ethical dilemmas associated with agriscience.

Advanced

- 1.1.12 Research agriscience technology topics.
- 1.1.13 Plan, organize and deliver a presentation on agriscience.
- 1.1.14 Design a bio-security system.
- 1.1.15 Design and conduct an experiment using topics such as biotechnology applications, tissue culture, cloning/embryo transfer, electrophoresis.
- 1.1.16 Debate issues in agriscience.

Keys to Employability

Basic Skills

1. Reading → Locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules.
2. Writing → Communicates thoughts, ideas, information, and messages in writing; and creates documents such as letters, directions, manuals, reports, graphs, and flow charts.
3. Arithmetic/Mathematics → Performs basic computations and approaches practical problems by choosing appropriately from a variety of mathematical techniques.
4. Listening → Receives, attends to, interprets, and responds to verbal messages and other cues.
5. Speaking → Organizes ideas and communicates orally.

Thinking Skills

1. Creative Thinking → Generates new ideas.
2. Decision Making → Specifies goals and constraints, generates alternatives, considers risks, and evaluates and chooses best alternative.
3. Problem Solving → Recognizes problems and devises and implements plan of action.
4. Seeing Things in the Mind's Eye → Organizes, processes symbols, pictures, graphs, objects, and other information.
5. Knowing How to Learn → Uses efficient learning techniques to acquire and apply new knowledge and skills.
6. Reasoning → Discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem.

Information

1. Acquires and Evaluates Information.
2. Organizes and Maintains Information.
3. Interprets and Communicates Information.
4. Uses Computers to Process Information.

Standard 1: AGRISCIENCE RELATED ISSUES – Understand current issues related to agriscience.

Topic 2: Explore career opportunities in agriscience.

Student Competencies

Keys to Employability

Introductory

- 1.2.1 Explore careers in agriscience.
- 1.2.2 Describe the nature of career opportunities in agriscience.
- 1.2.3 Determine preparation requirements for given careers.

Core

- 1.2.4 Demonstrate employability skills (e.g. resume, interviewing skills, application completion, etc.).
- 1.2.5 Link SAE areas to Agriscience.
- 1.2.6 Research professions within this field (e.g. interview professionals, skills required, job shadows, etc.).
- 1.2.7 Encourage the establishment of SAEs in agriscience.

Advanced

- 1.2.8 Encourage the establishment of SAEs in agriscience.

Personal Qualities

- 1. Responsibility → Exerts a high level of effort and perseveres towards goal attainment.
- 2. Self-Esteem → Believes in own self worth and maintains a positive view of self.
- 3. Sociability → Demonstrates understanding, friendliness, adaptability, empathy, and politeness in group setting.
- 4. Self-Management → Assesses self accurately, sets personal goals, monitors progress, and exhibits self-control.
- 5. Integrity/Honesty → Chooses ethical courses of action.

Resources

- 1. Time → Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.
- 2. Money → Uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives.
- 3. Material and Facilities → Acquires, stores, allocates, and uses materials or space efficiently.
- 4. Human Resources → Assesses skills and distributes work accordingly, evaluates performance and provides feedback.

Interpersonal

- 1. Participates as a Member of a Team → Contributes to group effort.
- 2. Teaches Others New Skills.
- 3. Serves Clients/Customers → Works to satisfy customers' expectations.
- 4. Exercises Leadership → Communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies.
- 5. Negotiates → Works toward agreements involving exchange of resources; resolves divergent interests.
- 6. Works with Diversity → Works well with men and women from diverse backgrounds.

Standard 1: AGRISCIENCE RELATED ISSUES—Understand current issues related to agriscience.

Academic Cross Walk

English Language Arts

- 9.1.1 Choose a broad topic, state the problem, or question
- 9.1.3 Cross-reference information
- 9.1.4 Evaluate relevancy of information
- 9.1.5 Organize information from a variety of sources; e.g., chronological
- 9.1.6 Summarize information
- 9.1.7 Identify and avoid plagiarism
- 9.1.9 Use graphic organizer
- 10.1.1 Form questions to focus research
- 10.1.2 Know ways to effectively search electronic databases
- 10.1.3 Gather reliable information to support a thesis
- 10.1.4 Use relevant information
- 10.1.5 Organize information from a variety of sources into a unified whole
- 10.1.7 Paraphrase information
- 10.1.10 Write a research paper
- 10.1.11 Present research information
- 11.1.1 Research topics independently using appropriate sources
- 11.1.2 Evaluate and incorporate information from primary sources
- 11.1.4 Verify the quality, accuracy, and usefulness of information
- 11.1.5 Synthesize information in a logical sequence
- 12.1.1 Plan a research strategy
- 12.1.3 Develop a research question
- 12.1.4 Defend research paper or project
- 9.2.6 Demonstrate oral reading fluency
- 9.2.7 Access prior knowledge to interpret meaning
- 9.2.12 Explain ways in which the setting affects the development of a story
- 10.2.7 Apply universal themes to real life situations
- 11.2.6 Apply prior knowledge of content to interpret meaning of text
- 12.2.8 Use technical language/jargon to decipher meaning
- 9.3.3 Develop a composition detailing an opinion
- 9.3.8 Use supporting details
- 9.3.11 Arrange paragraphs in a logical progression
- 9.3.12 Use technology; e.g., publishing software and graphic programs, to present written work
- 10.3.2 Defend a personal opinion using facts as support
- 10.3.4 Organize the ideas and details of a composition according to purpose
- 10.3.7 Use a variety of supporting details
- 10.3.10 Use a specific point of view in compositions
- 11.3.2 Organize the ideas and details of a composition according to purpose

English Language Arts (cont.)

- 11.3.3 Elaborate ideas through word choice and description using grade-level vocabulary
- 11.3.5 Use a variety of supporting details
- 11.3.8 Incorporate visual aids (e.g., graphs, tables, and pictures) into written work to enhance meaning
- 12.3.4 Use variety of sources for supporting details
- 12.3.5 Elaborate ideas through word choice and description using grade-level vocabulary
- 9.6.3 Use conventions of punctuation
- 9.3.10 Edit and revise compositions for proper mechanics and grammar, syntax, diction, and order
- 10.5.2 Use media for a variety of purposes
- 9.3.1 Write expository texts; e.g., essays, directions, and letters
- 9.3.10 Edit and revise compositions for proper mechanics and grammar, syntax, diction, and order
- 10.3.1 Write expository texts including research papers
- 11.3.1 Gather information supporting multiple sides of an issue
- 12.3.2 Write persuasive compositions, including structuring arguments logically, using rhetorical devices, defending positions with evidence, and addressing readers' concerns and biases
- 9.4.2 Use visual aides effectively in oral presentations
- 9.4.3 Use notes and manuscripts to make oral presentations
- 9.4.5 Use critical listening skills
- 10.4.3 Formulate questions in response to a verbal message
- 11.4.2 Adapt to a variety of speaking and listening situations such as formal presentations, oral interpretations, and group discussions
- 12.4.2 Use tone, inflection, pitch, and emphasis effectively in oral presentations
- 12.4.4 Use critical listening responses, such as refutation and commentary, to critique the accuracy of messages
- 12.4.5 Use oral composition techniques to perform speeches such as memorized speeches, impromptu and extemporaneous, persuasive/argumentative, and expository speeches

Standard 1: AGRISCIENCE RELATED ISSUES—Understand current issues related to agriscience.

Academic Cross Walk

Library/Technology Literacy

- 12.1.1 Define a research problem or task
- 12.1.2 Plan a research strategy
- 12.1.3 Access information using a variety of sources
- 12.1.4 Use a variety of criteria to evaluate and select information for research
- 12.1.5 Use organizational strategies to record and synthesize information
- 12.1.6 Present research
- 12.1.7 Evaluate the research process
- 12.2.1 Demonstrate awareness of audience when creating media products
- 12.2.2 Synthesize information to create a product that meets a specific need
- 12.2.3 Use a variety of criteria to evaluate media products
- 12.2.4 Use a variety of media and technology to communicate with communities beyond the school
- 12.3.1 Explain and use appropriate terminology and concepts associated with media and technology
- 12.3.2 Apply strategies for identifying and solving routine hardware and software problems
- 12.3.3 Explain features and uses of current and emerging media and technology
- 12.3.4 Explain ways in which social and economic forces influence which technologies will be developed and used
- 12.4.1 Work cooperatively and collaboratively when using media and technology
- 12.4.2 Develop competence and selectivity in reading, listening, and viewing
- 12.4.3 Demonstrate self-motivation in seeking information
- 12.4.4 Use a variety of media and technology for personal needs and enjoyment
- 12.5.1 Follow school policies for responsible use of information resources
- 12.5.2 Demonstrate proper form of citations and bibliographies
- 12.5.3 Understand and obey intellectual property laws, including copyright, when using information in any format
- 12.5.4 Understand the impact of equitable access to information in a democracy
- 8.1.1 Define a research problem or task
- 8.1.2 Plan a research strategy
- 8.1.3 Access information using a variety of sources
- 8.1.4 Use a variety of criteria to evaluate and select information for research

Library/Technology Literacy (cont.)

- 8.1.5 Use organizational strategies to gather, record, and synthesize information
- 8.1.6 Present research
- 8.1.7 Evaluate the research process
- 8.2.1 Create media products focused for a variety of audiences
- 8.2.2 Select appropriate communication formats
- 8.2.3 Use a variety of strategies to present media products
- 8.2.4 Use a variety of techniques to evaluate the effectiveness of media products
- 8.3.1 Use appropriate terminology and concepts associated with media and technology
- 8.3.2 Use and refine skills and procedures needed to operate various media and technology
- 8.3.3 Develop troubleshooting strategies to solve technical problems
- 8.3.4 Use the most effective media and technology for specific needs
- 8.3.5 Understand the potential and limitations of existing media and technology
- 8.4.1 Collaborate in group projects and learning objectives
- 8.4.2 Develop competence in selecting from a variety of reading, listening, and viewing formats
- 8.4.3 Demonstrate self-motivation and increasing responsibility for learning by pursuing information related to personal interests
- 8.4.4 Understand different perspectives and the values and beliefs supporting them.
- 8.5.1 Follow school guidelines for responsible use of technology and information resources
- 8.5.2 Use level-appropriate methods to cite and document reference sources
- 8.5.3 Demonstrate knowledge of intellectual property rights laws
- 8.5.4 Understand the past, present, and future impact of technology on society

Standard 1: AGRISCIENCE RELATED ISSUES—Understand current issues related to agriscience.

Academic Cross Walk

Mathematics

- 9-10.1.7 Apply basic properties of exponents to simplify algebraic expressions
- 9-10.1.8 Apply estimation skills to predict realistic solutions to problems
- 9-10.1.9 Select and use a computational technique to solve problems involving real numbers
- 9-10.1.10 Explain the reasonableness of a problem's solution and the process used to obtain it
- 9-10.1.11 Add, subtract, and perform scalar multiplication on matrices
- 11-12.1.7 Add, subtract, and multiply complex numbers
- 9-10.2.3 Use trigonometric relationships and the Pythagorean Theorem to determine side lengths and angle measures in right triangles
- 9-10.2.6 Use distance, midpoint, and slope to determine relationships between points, lines, and plane figures in the Cartesian coordinate system
- 9-10.2.7 Identify and perform transformations of objects in the plane using sketches (translations, reflections, rotations, dilations) and coordinates (translations, reflections, dilations)
- 9-10.2.10 Recognize images of the same object shown from different perspectives
- 9-10.3.1 Construct appropriate displays of given data
- 9-10.3.2 Interpret a given visual representation of a set of data
- 9-10.3.3 Identify the variable, sample, and population in a well-designed study
- 9-10.3.4 Determine the number of possible outcomes for a given event, using appropriate counting techniques
- 9-10.3.5 Calculate experimental and theoretical probabilities with and without replacement
- 9-10.3.6 Calculate probabilities of compound events using addition and multiplication rules
- 9-10.3.7 Calculate measures of central tendency and spread, i.e., mean, median, mode, range, and quartiles
- 9-10.3.8 Discuss relationships among measures of central tendency and spread
- 11-12.3.1 Choose, construct, and interpret a display to represent a set of data
- 11-12.3.2 Make predictions based on theoretical probabilities and experimental results
- 11-12.3.3 Select, calculate, and use appropriate measures of central tendency and spread to draw meaningful conclusions about a set of data
- 9-10.4.1 Select appropriate units and scales for problem situations involving measurement

Mathematics (cont.)

- 9-10.4.2 Describe the effects of scalar change on the area and volume of a figure
- 9-10.4.3 Use approximations to compare the standard and metric systems of measurement
- 9-10.4.4 Given a conversion factor, convert between standard and metric measurements
- 9-10.4.5 Use methods necessary to achieve a specified degree of precision and accuracy in measurement situations
- 9-10.4.6 Employ estimation techniques to evaluate reasonableness of results in measurement situations
- 9-10.4.10 Apply indirect measurement techniques to solve problems involving irregular shapes or inaccessible objects
- 9-10.5.2 Express relations and functions using a variety of representations, i.e., numeric, graphic, symbolic, and verbal
- 9-10.5.3 Determine whether a relation is a function by examining various representations of the relation
- 9-10.5.4 Perform the operations of addition, subtraction, multiplication, and division on algebraic functions
- 9-10.5.7 Develop algebraic expressions, equations, or inequalities involving one or two variables to represent relationships found in various contexts
- 9-10.5.10 Solve a literal equation for a specified variable
- 9-10.5.13 Interpret a graphical representation of a real-world situation
- 9-10.5.14 Draw conclusions about a situation being modeled

Standard 1: AGRISCIENCE RELATED ISSUES—Understand current issues related to agriscience.

Academic Cross Walk

Science

- 9-10.1.1 Understand the interaction of components within a system
- 9-10.1.6 Explain how models can be used to illustrate scientific principles
- 11-12.1.1 Understand the structure, organization, and dynamics of components within a system
- 11-12.1.4 Know how classification can be based on the relationship between form and function
- 11-12.1.6 Understand how scientists create and use models to address scientific knowledge
- 9-10.2.1 Use appropriate safety equipment and precautions during investigations
- 9-10.2.2 Identify questions and concepts that guide scientific investigations
- 9-10.2.3 Formulate a testable hypothesis for a simple investigation
- 9-10.2.4 Identify the independent and dependent variables, the control, and the constants when conducting an experiment
- 9-10.2.5 Design and conduct a guided investigation
- 9-10.2.6 Maintain clear and accurate records of scientific investigations
- 9-10.2.7 Analyze data found in tables, charts, and graphs to formulate conclusions
- 9-10.2.8 Understand that scientific investigations sometimes result in new ideas
- 11-12.2.1 Use appropriate safety equipment and precautions during investigations
- 11-12.2.2 Select and use appropriate instruments, measuring tools, and units of measure to improve scientific investigations
- 11-12.2.3 Use data from scientific investigations in order to accept or reject a hypothesis
- 11-12.2.4 Formulate and revise explanations based upon scientific knowledge and experimental data
- 11-12.2.5 Use technology and mathematics to improve investigations and communications
- 11-12.2.6 Analyze data using appropriate strategies
- 11-12.2.7 Design and conduct an independent investigation
- 11-12.2.8 Communicate and defend a scientific argument
- 11-12.2.9 Understand that scientific explanations must adhere to criteria
- 11-12.2.10 Understand that new knowledge and methods emerge from different types of investigations and public communication among scientists
- 9-10.4.1 Relate cell function to cell structure
- 9-10.4.2 Relate the functions of cells in multicellular organisms to their cell type
- 9-10.4.3 Know the relationship between protein structure and function

Science (cont.)

- 9-10.4.4 Understand how DNA, genes, and chromosomes are related
- 9-10.4.5 Know that spontaneous changes in DNA are a source of genetic variation
- 9-10.4.6 Know how mitosis and meiosis differ
- 9-10.4.7 Apply the basic concepts of genetics to predict inherited traits
- 9-10.4.8 Relate the concept of natural selection to its evolutionary consequences
- 9-10.4.12 Compare and contrast photosynthesis and cellular respiration
- 11-12.4.1 Explain the importance of cell differentiation in the development of multicellular organisms
- 11-12.4.2 Explain how types of DNA technology impact society
- 11-12.4.3 Explain how change through time has ensured adaptation to changing environments
- 11-12.4.4 Understand that producers store the Sun's energy in organic molecules, and consumers use that energy for life processes
- 9-10.5.5 Know the effects of human activities on the environment
- 9-10.6.1 Use appropriate technologies and techniques to solve a problem
- 9-10.6.2 Know how scientific principles have been used to create common technologies
- 9-10.6.3 Know how emerging technologies may impact society and the environment
- 11-12.6.1 Select and use appropriate technologies, tools, and techniques to solve a problem
- 11-12.6.2 Know examples of how new technologies advance science
- 11-12.6.3 Explain how designing and implementing technology requires weighing trade-offs between positive and negative impacts on humans and the environment
- 9-10.7.2 Understand factors that affect populations
- 11-12.7.2 Explain ways renewable and nonrenewable resources are managed
- 11-12.7.3 Understand the economic and social impact of using alternative energy resources
- 11-12.7.4 Explain how science and technology can influence personal, industrial, and cultural decision-making
- 9-10.8.1 Know theories have changed over time
- 9-10.8.2 Understand how views and attitudes have influenced the development of science
- 9-10.8.3 Understand the role of scientists in theoretical and applied science
- 9-10.8.4 Understand how human characteristics influence scientific advancement
- 9-10.8.5 Understand how individuals and groups, from different disciplines in and outside of science, contribute to science at different levels of complexity
- 11-12.8.1 Know the criteria that scientific explanations must meet to be considered valid



Standard 2: PRINCIPLES OF AGRISCIENCES – Explore the basic principles of animal science, plant science, food science, biotechnology, energy and power, agribusiness, and natural resources.

Topic 1: Validate application of technological principles to the identification, growth, and reproduction of animals.

Student Competencies

Keys to Employability

Introductory

- 2.1.1 Define terms associated with small and large animal production.
- 2.1.2 Define genetic terminology.
- 2.1.3 Define aquatic animals.

Core

- 2.1.4 Identify systems of animals (e.g. muscular, skeletal, vascular systems, etc.)
- 2.1.5 Appraise genetic outcomes (e.g. Punnett Square).
- 2.1.6 Define cloning/embryo transfer.
- 2.1.7 Describe the function of the immune system.
- 2.1.8 Describe disease transmission.
- 2.1.9 Investigate current issues/concerns in animal agriculture.

Advanced

- 2.1.10 Design and conduct an experiment using topics such as biotechnology applications and cloning/embryo transfer.
- 2.1.11 Extract DNA samples.

Basic Skills

1. Reading → Locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules.
2. Writing → Communicates thoughts, ideas, information, and messages in writing; and creates documents such as letters, directions, manuals, reports, graphs, and flow charts.
3. Arithmetic/Mathematics → Performs basic computations and approaches practical problems by choosing appropriately from a variety of mathematical techniques.
4. Listening → Receives, attends to, interprets, and responds to verbal messages and other cues.
5. Speaking → Organizes ideas and communicates orally.



Standard 2: PRINCIPLES OF AGRISCIENCES – Explore the basic principles of animal science, plant science, food science, biotechnology, energy and power, agribusiness, and natural resources.

Topic 2: Validate application of technological principles to the identification, growth, and reproduction of plants.

Student Competencies

Introductory

- 2.2.1 Define basic terms associated with plant production.
- 2.2.2 Define aquatic plants.
- 2.2.3 Define hydroponics.

Core

- 2.2.4 Investigate biotechnology applications such as tissue culture, cloning, aquaculture and electrophoresis.
- 2.2.5 Discuss issues associated with genetic enhancement.
- 2.2.6 Name the elements necessary for plant growth.
- 2.2.7 Identify Integrated Pest Management.
- 2.2.8 Describe disease transmission.
- 2.2.9 Investigate current issues/concerns in animal agriculture.

Advanced

- 2.2.10 Design and conduct an experiment using topics such as biotechnology applications, hydroponics, tissue culture, aquaculture, and electrophoresis.

Keys to Employability

Thinking Skills

1. Creative Thinking → Generates new ideas.
2. Decision Making → Specifies goals and constraints, generates alternatives, considers risks, and evaluates and chooses best alternative.
3. Problem Solving → Recognizes problems and devises and implements plan of action.
4. Seeing Things in the Mind's Eye → Organizes, processes symbols, pictures, graphs, objects, and other information.
5. Knowing How to Learn → Uses efficient learning techniques to acquire and apply new knowledge and skills.
6. Reasoning → Discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem.

Standard 2: PRINCIPLES OF AGRISCIENCES – Explore the basic principles of animal science, plant science, food science, biotechnology, energy and power, agribusiness, and natural resources.

Topic 3: Analyze the production, harvesting, and processing of agriscience products.

Student Competencies

Introductory

- 2.3.1 Identify principles in specialty crops.
- 2.3.2 Explain fermentation processes.
- 2.3.3 Relate microbiology concepts to agriculture products
- 2.3.4 Identify food safety rules and regulations (e.g. HACCP, FDA, etc.).
- 2.3.5 Identify microorganisms (e.g. bacteria, fungi, yeast, viruses).

Core

- 2.3.6 Evaluating grades and standards of agricultural products.
- 2.3.7 Determine the feasibility of harvesting/producing specialty crops.
- 2.3.8 Interpret product package labeling.
- 2.3.9 Recognize safety concerns in packaging and handling food products.
- 2.3.10 Describe the benefits of bacteria in food science.

Advanced

- 2.3.11 Conduct experiments using microorganisms.

Keys to Employability

Personal Qualities

1. Responsibility → Exerts a high level of effort and perseveres towards goal attainment.
2. Self-Esteem → Believes in own self worth and maintains a positive view of self.
3. Sociability → Demonstrates understanding, friendliness, adaptability, empathy, and politeness in group setting.
4. Self-Management → Assesses self accurately, sets personal goals, monitors progress, and exhibits self-control.
5. Integrity/Honesty → Chooses ethical courses of action.



Standard 2: PRINCIPLES OF AGRISCIENCES – Explore the basic principles of animal science, plant science, food science, biotechnology, energy and power, agribusiness, and natural resources.

Topic 4: Interpret the relationship between natural resources and agriculture.

Student Competencies

Keys to Employability

Introductory

- 2.4.1 Describe the cycles of water, carbon, nitrogen, etc.
- 2.4.2 Discuss safe environmental practices.
- 2.4.3 Explain the economic importance of natural resource management.
- 2.4.4 Identify agriculture ecosystems.
- 2.4.5 Identify habitats.

Core

- 2.4.6 Describe symbiotic environment.
- 2.4.7 Explain the affect of agriculture on natural resources (e.g. soil, water, air).
- 2.4.8 Describe state/federal regulations concerning agriculture and the environment.
- 2.4.9 Describe carrying capacity

Advanced

- 2.4.10 Evaluate water quality in different production systems.
- 2.4.11 Design an agriculture ecosystem.
- 2.4.12 Design a habitat

Interpersonal

1. Participates as a Member of a Team → Contributes to group effort.
2. Teaches Others New Skills.
3. Serves Clients/Customers → Works to satisfy customers' expectations.
4. Exercises Leadership → Communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies.
5. Negotiates → Works toward agreements involving exchange of resources; resolves divergent interests.
6. Works with Diversity → Works well with men and women from diverse backgrounds.



Standard 2: PRINCIPLES OF AGRISCIENCES – Explore the basic principles of animal science, plant science, food science, biotechnology, energy and power, agribusiness, and natural resources.

Topic 5: Validate application of mechanization principles to agricultural energy and power systems.

Student Competencies

Introductory

- 2.5.1 Describe basic operation of agriculture power equipment.
- 2.5.2 Describe basic principles and uses of agricultural machines.

Core

- 2.5.3 Demonstrate basic maintenance of agriculture machinery.
- 2.5.4 Explain the uses of Global Positioning Systems/Geographic Information Systems.

Advanced

- 2.5.5 Design and write a CNC (computer numerated control) program.
- 2.5.6 Design and write a CAD (computer assisted drafting) program.
- 2.5.7 Use GPS (global position system) system to navigate to given points.

Keys to Employability

Resources

- 1. Time→ Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.
- 2. Money→ Uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives.
- 3. Material and Facilities→ Acquires, stores, allocates, and uses materials or space efficiently.
- 4. Human Resources→ Assesses skills and distributes work accordingly, evaluates performance and provides feedback.

Information

- 1. Acquires and Evaluates Information.
- 2. Organizes and Maintains Information.
- 3. Interprets and Communicates Information.
- 4. Uses Computers to Process Information.

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Topic 6: Describe principles of agribusiness management related to agriscience.

Student Competencies

Introductory

- 2.6.1 Explain basic economic principles applicable to agribusiness.
- 2.6.2 Define management terms.
- 2.6.3 Define entrepreneurship opportunities.
- 2.6.4 Identify factors in marketing agricultural products.

Core

- 2.6.5 Keep accurate records.
- 2.6.6 Use computer applications.
- 2.6.7 List management practices.
- 2.6.8 Create a spreadsheet to determine economic feasibility.

Advanced

- 2.6.9 Design a computer application relating to an agriculture topic.
- 2.6.10 Analyze statistical information in agribusiness decision making.

Keys to Employability

Systems

- 1. Understands Systems → Knows how social, organizational, and technological systems work and operates effectively with them.
- 2. Monitors and Corrects Performance → Distinguishes trends, predicts impacts on system operations, diagnoses deviations in systems' performance and corrects malfunctions.
- 3. Improves or Designs Systems → Suggests modifications to existing systems and develops new or alternative systems to improve performance.

Technology

- 1. Selects Technology → Chooses procedures, tools, or equipment including computers and related technologies.
- 2. Applies Technology to Task → Understands overall intent and proper procedures for setup and operation of equipment.
- 3. Maintains and Troubleshoots Equipment → Prevents, identifies, or solves problems with equipment, including computers and other technologies.

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Academic Cross Walk

English Language Arts

- 9.1.1 Choose a broad topic, state the problem, or question
- 9.1.3 Cross-reference information
- 9.1.4 Evaluate relevancy of information
- 9.1.5 Organize information from a variety of sources; e.g., chronological
- 9.1.6 Summarize information
- 9.1.7 Identify and avoid plagiarism
- 9.1.9 Use graphic organizer
- 10.1.1 Form questions to focus research
- 10.1.2 Know ways to effectively search electronic databases
- 10.1.3 Gather reliable information to support a thesis
- 10.1.4 Use relevant information
- 10.1.5 Organize information from a variety of sources into a unified whole
- 10.1.7 Paraphrase information
- 10.1.10 Write a research paper
- 10.1.11 Present research information
- 11.1.1 Research topics independently using appropriate sources
- 11.1.2 Evaluate and incorporate information from primary sources
- 11.1.4 Verify the quality, accuracy, and usefulness of information
- 11.1.5 Synthesize information in a logical sequence
- 12.1.1 Plan a research strategy
- 12.1.3 Develop a research question
- 12.1.4 Defend research paper or project
- 9.2.6 Demonstrate oral reading fluency
- 9.2.7 Access prior knowledge to interpret meaning
- 9.2.12 Explain ways in which the setting affects the development of a story
- 10.2.7 Apply universal themes to real life situations
- 11.2.6 Apply prior knowledge of content to interpret meaning of text
- 12.2.8 Use technical language/jargon to decipher meaning
- 9.3.3 Develop a composition detailing an opinion
- 9.3.8 Use supporting details
- 9.3.11 Arrange paragraphs in a logical progression
- 9.3.12 Use technology; e.g., publishing software and graphic programs, to present written work
- 10.3.2 Defend a personal opinion using facts as support
- 10.3.4 Organize the ideas and details of a composition according to purpose
- 10.3.7 Use a variety of supporting details
- 10.3.10 Use a specific point of view in compositions

English Language Arts (cont.)

- 11.3.2 Organize the ideas and details of a composition according to purpose
- 11.3.3 Elaborate ideas through word choice and description using grade-level vocabulary
- 11.3.5 Use a variety of supporting details
- 11.3.8 Incorporate visual aids (e.g., graphs, tables, and pictures) into written work to enhance meaning
- 12.3.4 Use variety of sources for supporting details
- 12.3.5 Elaborate ideas through word choice and description using grade-level vocabulary
- 9.6.3 Use conventions of punctuation
- 9.3.10 Edit and revise compositions for proper mechanics and grammar, syntax, diction, and order
- 10.5.2 Use media for a variety of purposes
- 9.3.1 Write expository texts; e.g., essays, directions, and letters
- 9.3.10 Edit and revise compositions for proper mechanics and grammar, syntax, diction, and order
- 10.3.1 Write expository texts including research papers
- 11.3.1 Gather information supporting multiple sides of an issue
- 12.3.2 Write persuasive compositions, including structuring arguments logically, using rhetorical devices, defending positions with evidence, and addressing readers' concerns and biases
- 9.4.2 Use visual aides effectively in oral presentations
- 9.4.3 Use notes and manuscripts to make oral presentations
- 9.4.5 Use critical listening skills
- 10.4.3 Formulate questions in response to a verbal message
- 11.4.2 Adapt to a variety of speaking and listening situations such as formal presentations, oral interpretations, and group discussions
- 12.4.2 Use tone, inflection, pitch, and emphasis effectively in oral presentations
- 12.4.4 Use critical listening responses, such as refutation and commentary, to critique the accuracy of messages
- 12.4.5 Use oral composition techniques to perform speeches such as memorized speeches, impromptu and extemporaneous, persuasive/argumentative, and expository speeches

Standard 2: PRINCIPLES OF AGRISCIENCES—Explore the basic principles of animal science, plant science, food science, biotechnology, energy and power, agribusiness, and natural resources.

Academic Cross Walk

Library/Technology Literacy

- 12.1.1 Define a research problem or task
- 12.1.2 Plan a research strategy
- 12.1.3 Access information using a variety of sources
- 12.1.4 Use a variety of criteria to evaluate and select information for research
- 12.1.5 Use organizational strategies to record and synthesize information
- 12.1.6 Present research
- 12.1.7 Evaluate the research process
- 12.2.1 Demonstrate awareness of audience when creating media products
- 12.2.2 Synthesize information to create a product that meets a specific need
- 12.2.3 Use a variety of criteria to evaluate media products
- 12.2.4 Use a variety of media and technology to communicate with communities beyond the school
- 12.3.1 Explain and use appropriate terminology and concepts associated with media and technology
- 12.3.2 Apply strategies for identifying and solving routine hardware and software problems
- 12.3.3 Explain features and uses of current and emerging media and technology
- 12.3.4 Explain ways in which social and economic forces influence which technologies will be developed and used
- 12.4.1 Work cooperatively and collaboratively when using media and technology
- 12.4.2 Develop competence and selectivity in reading, listening, and viewing
- 12.4.3 Demonstrate self-motivation in seeking information
- 12.4.4 Use a variety of media and technology for personal needs and enjoyment
- 12.5.1 Follow school policies for responsible use of information resources
- 12.5.2 Demonstrate proper form of citations and bibliographies
- 12.5.3 Understand and obey intellectual property laws, including copyright, when using information in any format
- 12.5.4 Understand the impact of equitable access to information in a democracy
- 8.1.1 Define a research problem or task
- 8.1.2 Plan a research strategy
- 8.1.3 Access information using a variety of sources
- 8.1.4 Use a variety of criteria to evaluate and select information for research

Library/Technology Literacy (cont.)

- 8.1.5 Use organizational strategies to gather, record, and synthesize information
- 8.1.6 Present research
- 8.1.7 Evaluate the research process
- 8.2.1 Create media products focused for a variety of audiences
- 8.2.2 Select appropriate communication formats
- 8.2.3 Use a variety of strategies to present media products
- 8.2.4 Use a variety of techniques to evaluate the effectiveness of media products
- 8.3.1 Use appropriate terminology and concepts associated with media and technology
- 8.3.2 Use and refine skills and procedures needed to operate various media and technology
- 8.3.3 Develop troubleshooting strategies to solve technical problems
- 8.3.4 Use the most effective media and technology for specific needs
- 8.3.5 Understand the potential and limitations of existing media and technology
- 8.4.1 Collaborate in group projects and learning objectives
- 8.4.2 Develop competence in selecting from a variety of reading, listening, and viewing formats
- 8.4.3 Demonstrate self-motivation and increasing responsibility for learning by pursuing information related to personal interests
- 8.4.4 Understand different perspectives and the values and beliefs supporting them.
- 8.5.1 Follow school guidelines for responsible use of technology and information resources
- 8.5.2 Use level-appropriate methods to cite and document reference sources
- 8.5.3 Demonstrate knowledge of intellectual property rights laws
- 8.5.4 Understand the past, present, and future impact of technology on society

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Academic Cross Walk

Mathematics

- 9-10.1.7 Apply basic properties of exponents to simplify algebraic expressions
- 9-10.1.8 Apply estimation skills to predict realistic solutions to problems
- 9-10.1.9 Select and use a computational technique to solve problems involving real numbers
- 9-10.1.10 Explain the reasonableness of a problem's solution and the process used to obtain it
- 9-10.1.11 Add, subtract, and perform scalar multiplication on matrices
- 11-12.1.7 Add, subtract, and multiply complex numbers
- 9-10.2.3 Use trigonometric relationships and the Pythagorean Theorem to determine side lengths and angle measures in right triangles
- 9-10.2.6 Use distance, midpoint, and slope to determine relationships between points, lines, and plane figures in the Cartesian coordinate system
- 9-10.2.7 Identify and perform transformations of objects in the plane using sketches (translations, reflections, rotations, dilations) and coordinates (translations, reflections, dilations)
- 9-10.2.10 Recognize images of the same object shown from different perspectives
- 9-10.3.1 Construct appropriate displays of given data
- 9-10.3.2 Interpret a given visual representation of a set of data
- 9-10.3.3 Identify the variable, sample, and population in a well-designed study
- 9-10.3.4 Determine the number of possible outcomes for a given event, using appropriate counting techniques
- 9-10.3.5 Calculate experimental and theoretical probabilities with and without replacement
- 9-10.3.6 Calculate probabilities of compound events using addition and multiplication rules
- 9-10.3.7 Calculate measures of central tendency and spread, i.e., mean, median, mode, range, and quartiles
- 9-10.3.8 Discuss relationships among measures of central tendency and spread
- 11-12.3.1 Choose, construct, and interpret a display to represent a set of data
- 11-12.3.2 Make predictions based on theoretical probabilities and experimental results
- 11-12.3.3 Select, calculate, and use appropriate measures of central tendency and spread to draw meaningful conclusions about a set of data
- 9-10.4.1 Select appropriate units and scales for problem situations involving measurement

Mathematics (cont.)

- 9-10.4.2 Describe the effects of scalar change on the area and volume of a figure
- 9-10.4.3 Use approximations to compare the standard and metric systems of measurement
- 9-10.4.4 Given a conversion factor, convert between standard and metric measurements
- 9-10.4.5 Use methods necessary to achieve a specified degree of precision and accuracy in measurement situations
- 9-10.4.6 Employ estimation techniques to evaluate reasonableness of results in measurement situations
- 9-10.4.9 Given a formula list, compute the surface area and volume of a right prism, right cylinder, right pyramid, right cone, and sphere
- 9-10.4.10 Apply indirect measurement techniques to solve problems involving irregular shapes or inaccessible objects
- 9-10.5.2 Express relations and functions using a variety of representations, i.e., numeric, graphic, symbolic, and verbal
- 9-10.5.3 Determine whether a relation is a function by examining various representations of the relation
- 9-10.5.4 Perform the operations of addition, subtraction, multiplication, and division on algebraic functions
- 9-10.5.7 Develop algebraic expressions, equations, or inequalities involving one or two variables to represent relationships found in various contexts
- 9-10.5.8 Manipulate algebraic expressions and equations using properties of real numbers
- 9-10.5.10 Solve a literal equation for a specified variable
- 9-10.5.13 Interpret a graphical representation of a real-world situation
- 9-10.5.14 Draw conclusions about a situation being modeled

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Academic Cross Walk

Science

- 9-10.1.1 Understand the interaction of components within a system
- 9-10.1.6 Explain how models can be used to illustrate scientific principles
- 11-12.1.1 Understand the structure, organization, and dynamics of components within a system
- 11-12.1.4 Know how classification can be based on the relationship between form and function
- 11-12.1.6 Understand how scientists create and use models to address scientific knowledge
- 9-10.2.1 Use appropriate safety equipment and precautions during investigations
- 9-10.2.2 Identify questions and concepts that guide scientific investigations
- 9-10.2.3 Formulate a testable hypothesis for a simple investigation
- 9-10.2.4 Identify the independent and dependent variables, the control, and the constants when conducting an experiment
- 9-10.2.5 Design and conduct a guided investigation
- 9-10.2.6 Maintain clear and accurate records of scientific investigations
- 9-10.2.7 Analyze data found in tables, charts, and graphs to formulate conclusions
- 9-10.2.8 Understand that scientific investigations sometimes result in new ideas
- 11-12.2.1 Use appropriate safety equipment and precautions during investigations
- 11-12.2.2 Select and use appropriate instruments, measuring tools, and units of measure to improve scientific investigations
- 11-12.2.3 Use data from scientific investigations in order to accept or reject a hypothesis
- 11-12.2.4 Formulate and revise explanations based upon scientific knowledge and experimental data
- 11-12.2.5 Use technology and mathematics to improve investigations and communications
- 11-12.2.6 Analyze data using appropriate strategies
- 11-12.2.7 Design and conduct an independent investigation
- 11-12.2.8 Communicate and defend a scientific argument
- 11-12.2.9 Understand that scientific explanations must adhere to criteria
- 11-12.2.10 Understand that new knowledge and methods emerge from different types of investigations and public communication among scientists
- 9-10.4.1 Relate cell function to cell structure
- 9-10.4.2 Relate the functions of cells in multicellular organisms to their cell type
- 9-10.4.3 Know the relationship between protein structure and function
- 9-10.4.4 Understand how DNA, genes, and chromosomes are related
- 9-10.4.5 Know that spontaneous changes in DNA are a source of genetic variation

Science (cont.)

- 9-10.4.6 Know how mitosis and meiosis differ
- 9-10.4.7 Apply the basic concepts of genetics to predict inherited traits
- 9-10.4.8 Relate the concept of natural selection to its evolutionary consequences
- 9-10.4.12 Compare and contrast photosynthesis and cellular respiration
- 11-12.4.1 Explain the importance of cell differentiation in the development of multicellular organisms
- 11-12.4.2 Explain how types of DNA technology impact society
- 11-12.4.3 Explain how change through time has ensured adaptation to changing environments
- 11-12.4.4 Understand that producers store the Sun's energy in organic molecules, and consumers use that energy for life processes
- 9-10.5.5 Know the effects of human activities on the environment
- 9-10.6.1 Use appropriate technologies and techniques to solve a problem
- 9-10.6.2 Know how scientific principles have been used to create common technologies
- 9-10.6.3 Know how emerging technologies may impact society and the environment
- 11-12.6.1 Select and use appropriate technologies, tools, and techniques to solve a problem
- 11-12.6.2 Know examples of how new technologies advance science
- 11-12.6.3 Explain how designing and implementing technology requires weighing trade-offs between positive and negative impacts on humans and the environment
- 9-10.7.2 Understand factors that affect populations
- 11-12.7.2 Explain ways renewable and nonrenewable resources are managed
- 11-12.7.3 Understand the economic and social impact of using alternative energy resources
- 11-12.7.4 Explain how science and technology can influence personal, industrial, and cultural decision-making
- 9-10.8.1 Know theories have changed over time
- 9-10.8.2 Understand how views and attitudes have influenced the development of science
- 9-10.8.3 Understand the role of scientists in theoretical and applied science
- 9-10.8.4 Understand how human characteristics influence scientific advancement
- 9-10.8.5 Understand how individuals and groups, from different disciplines in and outside of science, contribute to science at different levels of complexity
- 11-12.8.1 Know the criteria that scientific explanations must meet to be considered valid