Program Concentration: **Agriculture**
Career Pathway: **Agriscience**
Course Title: **Basic Agricultural Science and Technology**

This course is designed as an introduction or support course for the Agriscience Pathway Program of Study. The course introduces the major areas of scientific agricultural production and research; presents problem solving lessons and introductory skills and knowledge in agricultural science and agri-related technologies. Classroom and laboratory activities are supplemented through supervised agricultural experiences and leadership programs and activities.

AG-BAS-1: The student evaluates human needs and demonstrates the role of agriculture in meeting the needs of humans: historically, currently and in the future.

a. Explains the three basic human needs and sources of food, clothing and shelter.
b. Identifies major categories of food and fiber products.
c. Defines agriculture and agricultural industry.
d. Traces major changes and accomplishments in the history of agriculture.
e. Identifies the major branches of the agriculture industry.
f. Describes major factors in world consumer preferences.
g. Compares and contrasts US and world agriculture practices.
h. Discusses the skills needed for agricultural work and explains how they have changed.

Academic Standards:
SSEF4 The student will compare and contrast different economic systems, and explain how they answer the three basic economic questions of what to produce, how to produce and for whom to produce

SSUSH2 (a) Explain the development of mercantilism and the trans-Atlantic trade

ELA10RL4 (d.) Includes a formal works cited or bibliography when applicable

ELA10RL5 (c) Uses general dictionaries, specialized dictionaries, thesauruses, or related references as need to increase learning.

SCSh1 Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

AG-BAS-2: The student interprets the role of the applied sciences in Agriscience and identifies current issues relating to Agriscience.

a. Explains the role of agriscience and technology in society.
b. Relates important areas of agriscience and technology to four areas of scientific study.
c. Describes how the scientific method is used in agricultural research.
d. Explains the steps of the scientific method.
e. Describes the role of technology in agriculture and identifies major technological advances.
f. Predicts future needs from agriculture and the relationship of agriscience in meeting those needs.
g. Identifies current and future issues associated with agriscience and technology.

Academic Standards:
SSUSH7 (a)Explain the impact the Industrial Revolution as seen in Eli Whitney's invention of the cotton gin and his development of interchangeable parts for muskets

SSUSH11 (a) Explain the impact of the railroad on other industries such as steel and on the organization of big business (d.)describe the inventions of Thomas Edison, including the electric light bulb, motion pictures, and the phonograph, and their impact on American life;

SSUSH16(c.)Identify Henry Ford, mass production, and the automobile

SSUSH21(c.)Analyze the impact of technology on American life including the development of the personal computer and the cellular telephone

ELA10RC3 (a.) Demonstrates an understanding of contextual vocabulary in various subjects;

SCSh1 Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

SCSh3 Students will identify and investigate problems scientifically.

SCSh6 Students will communicate scientific investigations and information clearly.

AG-BAS-3: The student distinguishes between types of environmental natural resources and draws conclusions about human impact on the environment.

a. Defines environmental and natural resources.
b. Explains ecosystems and the interrelationship of natural resources.
c. Discusses agriculture's role in stewardship of the environment.
d. Distinguishes between renewable and nonrenewable natural resources.
e. Identifies examples, sources, and supply of renewable and nonrenewable natural resources.
f. Distinguishes between agricultural and non-agricultural sources of pollution.
g. Identifies human activities that are beneficial, non-beneficial, or harmful to the environment.
h. Identifies and explains the role of government agencies in conserving the environment.
i. Composes a personal and class plan to promote a safe environment at school and home.
j. Identifies career areas involved in environmental stewardship.
k. Describes methods of waste disposal, including recycling, bioremediation, etc.
l. Analyses the difficulties and economic feasibility of recycling different waste products.
m. Identifies ways to decrease land fills through conservation and recycling programs.
n. Prepares and presents position papers on the importance of proper waste disposal.
o. Identifies sources of pollution in agriculture and ways to prevent agriculture pollution.
p. Compares favorable and unfavorable conditions for applying agricultural chemicals.
q. Discusses the importance of reading and adhering to pesticide label directions.

Academic Standards:
SSEF1 The student will explain why limited productive resources and unlimited wants result in scarcity, opportunity costs and trade offs for individuals, businesses and governments

SSWG6 (g.) Analyze the environmental issues associated with industrial and natural resource development in Europe including Russia

SSWG7 (g.) Analyze the impact of deforestation on Latin America and explain actions being taken. (h.) Explain how Latin American countries are developing their resources to compete in the global market and develop industry such as Brazil

SSUSH18 (a.)Describe the creation of the Tennessee Valley Authority as a works program and as an effort to control the environment

ELA10RC2 (c.) Relates messages and themes from one subject area to those in another area;

SCSh6 Students will communicate scientific investigations and information clearly.

AG-BAS-4: The student will utilize weights and measures of agriculturally related items and calculate conversions using English and metric units.

a. Describes importance of weights and measures in agriscience.
b. Explains the importance of standard measurements in agriculture.
c. Provides weights and measurements used in agriculture.
d. Converts English to metric and metric to English standard measure.

Academic Standards:
ELA10RC2 (c.) Relates messages and themes from one subject area to those in another area.

SCSh4 Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

MM4P1 Students will solve problems (using appropriate technology).

MM4P4 Students will make connections among mathematical ideas and to other disciplines.

AG-BAS-5: The student identifies the common bases of life and relates them to agricultural production.

a. Explains important characteristics of organisms.
b. Describes the role of protoplasm.
c. Distinguishes between living and non-living things.
d. Explains energy and its role in living organisms.
e. Explains life span and its stages.
f. Describes how organisms respond to their environment.
g. Evaluates the life processes in organisms.
h. Names the major parts of a cell and explains the function of each cell structure.
i. Explains cell specialization and the structures formed.
j. Describes growth and cell divisions.
k. Explains heredity and genetics in agriscience.
l. Describes ways organisms can be improved

Academic Standards:

SB1 Students will analyze the nature of the relationships between structures and functions in living cells.

SB4 Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

AG-BAS-6: The student classifies living things according to scientific classification methods.

a. Explains taxonomy.
b. Describes a classification system for living things.
c. Names and distinguishes the five kingdoms.
d. Explains the scientific method of classification and nomenclature.
e. Matches scientific names with the common names of agriculture species.
f. Describes how classification systems are useful in agriscience and technology.

Academic Standard:
ELA10LSV1 (b.) Asks relevant questions; (c.) Responds to questions with appropriate information.

SB3 Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.

AG-BAS-7: The Student demonstrates an understanding of the basic principles of plant science.

a. Distinguishes plants from animals and explains how they are alike.
b. Describes how plants are adapted to climate.
c. Explains different plant life cycles and gives examples.
d. Identifies the major parts of the plant.
e. Describes the functions of vegetative plant parts.
f. Distinguishes between plant root systems and how they absorb water and nutrients.
g. Explains the kinds of tropism and why they are important.

Academic Standards:
ELA10RC2 (c.) Relates messages and themes from one subject area to those in another area;

ELA10LSV1 (c.) Responds to questions with appropriate information.

SB4 Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

AG-BAS-8: The student demonstrates plant propagation methods.

a. Explains ways plants reproduce.
b. Describes the role of seed in reproduction, sexually and asexually.
c. Explains the role of flowers in reproducing plants.
d. Describes how seed are formed, processed, stored, scarified, stratified and planted.
e. Describes germination and the conditions under which it occurs.
f. Explains the application of vegetative propagation.
g. Discusses use of improved seeds and cultivars and the importance of improved seed.

Academic Standards:
SB2 Students will analyze how biological traits are passed on to successive generations. (e) Compare the advantages of sexual reproduction and asexual reproduction in different situations.

AG-BAS-9: The student explains plant growth and the essential elements for plant health, growth, and reproduction.

a. Describes how plants grow.
b. Explains important factors in plant growth.
c. Explains the role of plant hormone.
d. Explains photosynthesis and its importance.
e. Explains respiration and transpiration and their importance.
f. Identifies essential plant nutrients for plant growth and reproduction.
g. Explains the use of organic and commercial fertilizers in plant production.

Academic Standard:
SB4 Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

SB2 (e) Compare the advantages of sexual reproduction and asexual reproduction in different situations.

AG-BAS-10: The student identifies major pests of agriculture, their damage and prescribed control methods.

a. Explains five major kinds of agricultural pests.
b. Explains three conditions needed for pest problems to exist and thrive.
c. Describes how pests are prevented and methods used to control them after infestation.
d. Explains integrated pest management (IPM) in pest control.
e. Describes how pests affect plants and cause losses.
f. Identifies important factors to consider for correct chemical storage.
g. Applies correct procedures used to properly dispose of chemicals and their containers.
h. Demonstrates safe practices in pest control.

Academic Standard:
SB4 Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

SB5 (e) Recognize the role of evolution to biological resistance (pesticide and antibiotic resistance).

AG-BAS-11: The student cites major animal groups and explains major organ and structural systems of animals.

a. Diagrams the major external parts of swine, cattle and equine.
b. Explains the major organ systems and functions of animals: skeletal, muscular, nervous, circulatory, respiratory, excretory, digestive, reproductive, and mammary systems.

Academic Standard:
ELA10RC2 (c) Relates messages and themes from one subject area to those in another area

S712 Students will describe the structure and function of cells, tissues, organs, and organ systems.

AG-BAS-12: The student utilizes the principles of animal nutrition and prescribes feedstuffs for various animal species.

a. Describes the feeds and nutrient needs of animals.
b. Describes the feedstuffs that provide animal nutrition.
c. Explains the characteristics of good animal feed.
d. Describes how animals are fed and prescribes feed programs.

Academic Standards:
ELA10RC3 (c) Explores understanding of new words found in subject area texts

SCSh2 Students will use standard safety practices for all classroom laboratory and field investigations.

MM4P1 Students will solve problems (using appropriate technology).

SB4 Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

AG-BAS-13: The student compares and contrasts breeds and bloodlines and describes breeding systems and techniques.

a. Lists and explains the importance of breed and bloodlines and pedigree in animal production.
b. Describes different breeding systems.
c. Classifies animals based on sexual condition.
d. Describes different production systems.
e. Distinguishes between methods of insemination.
f. Describes management practices in breeding animals.

Academic Standard:
ELA10RC4 (a) Explores life experiences related to subject area content.

SB5 Students will evaluate the role of natural selection in the development of the theory of evolution.

AG-BAS-14: The student analyzes information on animal growth and production.

a. Explains health and the signs of good and ill health.
b. Describes environmental influences on animal health.
c. Lists and explains the losses caused by poor animal health.
d. Explains how good health is maintained.
e. Describes kinds of diseases, gives examples of each and describes the ways animals respond to disease.

f. Explains general methods of disease control.

Academic Standard:
ELA10RC4 (a) Explores life experiences related to subject area content.

SB4 Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

AG-BAS-15: The student assesses the background and applications of biotechnology.

a. Defines biotechnology and explains its application in agriculture.
b. Identifies issues associated with biotechnology.
c. Distinguishes between two major areas of biotechnology.
d. Lists and explains examples of organismic biotechnology.
e. Describes the role of genetics, cells, and genomes in molecular biotechnology.
f. Identifies and describes types of cell division.
g. Describes the process of genetic engineering and the use of recombinant DNA.
h. Identifies areas of agriscience being developed through genetic engineering.

Academic Standard:
ELA10RC3 (a) Demonstrates an understanding of contextual vocabulary in various subjects; (b) Uses content vocabulary in writing and speaking.

SB1 Students will analyze the nature of the relationships between structures and functions in living cells.

AG-BAS-16: The student applies earth science principles to agricultural production.

a. Describes major features and resources of the earth.
b. Explains changes that occur in the earth.
c. Explains succession and its relationship to the earth.

Academic Standards:
SSEF1 (b) Define and give examples of productive resources as land (natural), labor (human), capital (capital goods), entrepreneurship.

SSWG1 (a) describe the concept of place by explaining how physical characteristics such as landforms, bodies of water, climate, soils, natural vegetation, and animal life are used to describe a place.

SES1 Students will investigate the composition and formation of Earth systems, including the Earth's relationship to the solar system.

AG-BAS-17: The student describes soil formation and management and assesses its relevance to plant and animal production.

a. Describes the materials that make soil and how it is formed.
b. Describes the ideal soil.
c. Describes a soil ecosystem and identifies parts.
d. Explains the ways that soil can be described.
e. Uses the soil triangle to determine soil texture class.
f. Describes the soil profile to determine factors that limit a soil's capability for producing

plants.
g. Determines horizon levels in a soil pit.
h. Explains the kinds of groundwater and how it is lost from the soil.
i. Describes internal and surface soil drainage.
j. Identifies acids and bases using pH scales.
k. Describes importance of soil pH on plants and prescribes ways to adjust pH.
l. Matches soil pH to plants to be grown.
m. Explains the relationship between soil and land.
n. Lists and describes the eight land capability classes.
o. Determines land class on a given site.
p. Describes the important soil management practices.

Academic Standards:
ELA10RC2 (a) Identifies messages and themes from books in all subject area.

SSWG8 (d) explain how the physical geography and the United States contributed to regional growth and development.

SES3 Students will explore the actions of water, wind, and gravity that create landforms and systems of landforms (landscapes).

AG-BAS-18: The student cites principles of chemistry and their relevance to agriscience.

a. Explains the concept, properties, and types of matter.
b. Distinguishes between elements, atoms, and molecules.
c. Describes how new compounds are formed.
d. Explains the importance of carbon.
e. Explains the four basic types of reactions used in agriscience.
f. Distinguishes between solutions and suspensions.
g. Explains acids, bases, and salts.
h. Describes common chemical processes in agriscience.

Academic Standards:
SC1. (b) Identify substances based on chemical and physical properties.

SPS6. (a) Describe solutions in terms of solute/solvent, conductivity, concentration; (b) Observe factors affecting the rate a solute dissolves in a specific solvent; (d) Compare and contrast the components and properties of acids and bases.

SC7. (b) Compare, contrast, and evaluate the nature of acids and bases.

AG-BAS-19: The student demonstrates the application of physics in agriscience.

a. Explains areas of physics used in agriscience.
b. Explains work and power.
c. Names and explains simple machines.
d. Describes mechanical advantage.
e. Explains the use of thermal energy, electrical energy, and compression in agriscience.

Academic Standards:
SP3 Students will evaluate the forms and transformations of energy.

SP5 Students will evaluate relationships between electrical and magnetic forces.

AG-BAS-20: The student will analyze important areas of agricultural marketing technology.

a. Describes the importance of agricultural marketing technology.
b. Explains ways that agricultural products are marketed.
c. Lists and explains the major functions in agricultural marketing.
d. Describes the role of marketing infrastructure.
e. Explains the role of communication in agricultural marketing.
f. Explain supply and demand in agriculture.

Academic Standards:
SSEMI3 The student will explain how markets, prices and competition influence economic behavior.

SSEMI1 (b) explain the role of money and how it facilitates exchange.

AG-BAS-21: The student outlines important areas of agricultural processing and processing technology.

a. Explains the meaning and importance of processing.
b. Lists and describes methods of food preservation.
c. Describes methods used in processing fiber products and wood products.
d. Describes safety and regulations that apply to processing.

Academic Standard:
ELA10LSV1 (e) Offers own opinion forcefully without domineering.

SC5 Students will understand that the rate at which a chemical reaction occurs can be affected by changing concentration, temperature, or pressure and the addition of a catalyst.

SB1 (b) Explain how enzymes function as catalyst.

AG-BAS-22: The student explores the use of mechanical energy in agricultural operations, identifies energy sources and uses, and identifies tools and equipment for agricultural operations.

a. Traces the development of agricultural machinery.
b. Explores the relationship of simple tools applied to agricultural operations and identifies the physical properties of each.
c. Identifies energy sources for agricultural operations.
d. Demonstrates the safe use of selected hand and power tools.

Academic Standard:

SP5 Students will evaluate relationships between electrical and magnetic forces. (a.) Describe the transformation of mechanical energy into electrical energy and the transmission of electrical energy.

AG-BAS-23: The student becomes oriented to the comprehensive program of agricultural education, learns to work safely in the agriculture lab and work sites, demonstrates selected competencies in leadership through the FFA and agricultural industry organizations, and develops plans for a supervised agricultural experience program (SAEP).

a. Explains the role of the Agriculture Education program and the FFA in personal development.
b. Demonstrates knowledge learned through a Supervised Agricultural Experience Program (SAEP).
c. Develops leadership and personal development skills through participation in the FFA.
d. Explores career opportunities in agriscience through the FFA and Agriculture Education Program.
e. Explores the professional agricultural organizations associated with the course content.

Academic Standard:
ELA10C1 The student demonstrates understanding and control of the rules of the English language, realizing that usage involves the appropriate application of conventions and grammar in both written and spoken formats.

SCSh6 Students will communicate scientific investigations and information clearly.

SCSh9 Students will enhance reading in all curriculum areas.

ELA10LSV1 (d) Actively solicits another person's comments or opinion. (e) Offers own opinion forcefully without domineering.

ELA10LSV1 (i) Employs group decision-making techniques such as brainstorming or a problem-solving sequence (e.g., recognizes problem, defines problem, identifies possible solutions, selects optimal solution, implements solution, evaluates solution)

ELA10LSV1 (e) Offers own opinion forcefully without domineering; (f) Contributes voluntarily and responds directly when solicited by teacher or discussion leader; (g) Gives reasons in support of opinions expressed.

CTAE Foundation Skills

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state's academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U. S. Department of Education's 16 Career Clusters. Endorsed by the National Career Technical Education

Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

CTAE-FS-1 Technical Skills: Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.

CTAE-FS-3 Communications: Learners use various communication skills in expressing and interpreting information.

CTAE-FS-4 Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.

CTAE-FS-5 Information Technology Applications: Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

CTAE-FS-6 Systems: Learners understand a variety of organizational structures and functions.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

CTAE-FS-8 Leadership and Teamwork: Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

CTAE-FS-9 Ethics and Legal Responsibilities: Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

CTAE-FS-10 Career Development: Learners plan and manage academic-career plans and employment relations.

CTAE-FS-11 Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.