

Agriscience

Primary Career Cluster:	Agriculture, Food, & Natural Resources
Course Contact:	CTE.Standards@tn.gov
Course Code(s):	C18H19
Prerequisite(s):	<i>None</i>
Credit:	1
Grade Level:	9
Elective Focus - Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Agriculture, Food, & Natural Resources courses. In addition, this course satisfies one credit of laboratory science required for graduation.
Concentrator:	This course satisfies one out of two required courses that must be taken from a single program of study to meet the Perkins V concentrator definition requirements.
Programs of Study and Sequence:	This is the first course in the <i>Agribusiness, Agricultural Engineering and Applied Technologies, Environmental and Natural Resources, Food Science, Horticulture Science, and Veterinary and Animal Science</i> programs of study.
Aligned Student Organization(s):	FFA: http://www.tnffa.org
Coordinating Work-Based Learning:	All Agriculture, Food, & Natural Resources students are encouraged to participate in a Supervised Agricultural Experience (SAE) program. In addition, Teachers are encouraged to use embedded WBL activities. For information, visit https://www.tn.gov/content/tn/education/career-and-technical-education/work-based-learning.html .
Available Student Industry Certifications:	Students are encouraged to demonstrate mastery of knowledge and skills learned in this course by earning the appropriate, aligned department-promoted industry certifications. Access the promoted list here for more information.
Teacher Endorsement(s):	(048 and 015), (048 and 016), (048 and 017), (048 and 081), (048 and 126), (048 and 127), (048 and 128), (048 and 129), (048 and 151), (048 and 211), (048 and 212), (048 and 213), (048 and 214), (048 and 414), (048 and 415), (048 and 416), (048 and 417), (048 and 418), (048 and 449), (048 and 951) (150 and 015), (150 and 016), (150 and 017), (150 and 081), (150 and 126), (150 and 127), (150 and 128), (150 and 129), (150 and 151), (150 and 211), (150 and 212), (150 and 213), (150 and 214), (150 and 414), (150 and 415), (150 and 416), (150 and 417), (150 and 418), (150 and 449), (150 and 951), (448 and 015), (448 and 016), (448 and 017), (448 and 081), (448 and 126), (448 and 127), (448 and 128), (448 and 129), (448 and 151), (448 and 211), (448 and 212), (448 and 213), (448 and 214), (448 and 414), (448 and 415), (448 and 416), (448 and 417), (448 and 418), (448 and 449), (448 and 951), (950 and 015), (950 and 016), (950 and 017), (950 and 081), (950 and 126), (950 and 127), (950 and 128), (950 and 129), (950 and 151), (950

	and 211), (950 and 212), (950 and 213), (950 and 214), (950 and 414), (950 and 415), (950 and 416), (950 and 417), (950 and 418), (950 and 449), (950 and 951)
Required Teacher Certifications/Training:	None
Teacher Resources:	https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-agriculture-food-natural-resources.html .

Course Description

Agriscience is an introductory laboratory science course that prepares students for biology, subsequent science and agriculture courses, and postsecondary study. This course helps students understand the important role that agricultural science and technology plays in the twenty-first century. In addition, it serves as the first course for all programs of study in the Agriculture, Food, & Natural Resources cluster. Upon completion of this course, proficient students will be prepared for success in more advanced agriculture and science coursework. This course counts as a lab science credit toward graduation requirements.

Program of Study Application

This course is the foundational course for all Agriculture, Food, & Natural Resources programs of study. For more information on the benefits and requirements of implementing these programs in full, please visit the Agriculture, Food, & Natural Resources website at <https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-agriculture-food-natural-resources.html>.

Course Standards

Agriscience Investigation and Overview

- 1) Synthesize research on the historical importance and purpose of agriculture and agriculture organizations, identifying major events, opportunities and technological developments influenced by agriscience theories and practices.
- 2) Identify and review general common laboratory safety procedures including but not limited to prevention and control procedures in agriscience laboratories. Incorporate safety procedures and complete safety test with 100 percent accuracy.

Agriculture and Society

- 3) Gather and analyze information from multiple authoritative sources, such as the United States Bureau of Labor Statistics, United States Department of Agriculture website and Tennessee labor data, to summarize the economic impact of the agricultural industry. Describe major career trends in Tennessee, the United States, and worldwide.
- 4) Determine how a Supervised Agricultural Experience (SAE) program functions as a method to apply concepts of the scientific investigation process (i.e. conducting an Agriscience Fair project). Compare and contrast the types of SAEs as related to their importance to the scientific investigation process.

- 5) Conduct a research project or literature review exploring a specific social and/or political impact on the agriculture industry at the local, state, national, or international level. For example, explore how the increase in availability of genetically modified organisms has impacted crop production and the green movement. Summarize findings in an informative essay. Revise, edit or rewrite as needed to strengthen writing.

Fundamentals of Environmental Systems

- 6) Describe the biogeochemical cycles impacting the agriculture industry by creating illustrative models and informative texts for the following:
 - a. Carbon cycle
 - b. Nitrogen cycle
 - c. Oxygen cycle
 - d. Water cycle
- 7) Critique the dynamics of biomass and energy flow in ecosystems by analyzing the major components of a food chain. Analyze the structure of the relationships among the concepts of carrying capacity, species populations, and organism interactions within multiple ecosystems and natural habitats.
- 8) Produce an informative essay to distinguish between types of pollution and their sources, defining and applying ecology- and conservation-specific terminology. Compare and contrast important connections between pollution and its effects on environmental conditions (i.e. water, soil and air), animal populations, and plant populations.

Fundamentals of Cell Biology

- 9) Compare basic plant and animal cell biology, including structure and function. Create a visual representation that identifies cellular organelles and major cell processes.
- 10) Compare and contrast the roles of proteins, carbohydrates, lipids, and nucleic acids as they relate to cell growth and cell reproduction.

Fundamentals of Genetics, Genomics and Heredity

- 11) Compare the difference between genetics and genomics. Synthesize research to analyze and describe the impact genomics has made in the plant and animal science industry. Compare and contrast the important connections between these advancements including but not limited to the CRISPR technology and the "Yuck factor", citing credible sources.
- 12) Determine the significance of and relationships between genes, chromosomes, proteins, and hereditary traits. Analyze the role of genes in determining genetic make-up, gender, and hereditary characteristics. Using systems of equations, explain the variation and distribution of genotypes and phenotypes expressed in plants and animals.

Fundamentals of Anatomy and Physiology

- 13) Using graphic illustrations and supporting text, identify and describe major animal body systems (skeletal, muscular, respiratory, digestive, nervous, circulatory, respiratory, and reproductive) to establish a basic knowledge of their purpose, structure, and function.

Chemistry of Animal Digestion

- 14) Classify the types of digestive systems in domestic animals, and compare and contrast their anatomical and physiological differences. Synthesize research on animal nutrition (using academic journals or publications from Tennessee Extension Service) to produce an informative narrative, including defining and applying nutrition specific terminology, to examine the stages of digestion and associated processes.
- 15) Use the periodic table and the atomic chart to compare differences between ionic and covalent bonding as related to digestion. Demonstrate an understanding of the interdependence of the complex chemical and biological processes involved in the digestion process including, but not limited to, the following: elements, compounds, mixtures, and acids.
- 16) Research the relationship between metabolism, energy, and nutrition. Evaluate life stage and activity level to determine the nutritional needs of animals. Differentiate types of rations to maximize animal performance.

Fundamentals of Plant and Soil Science

- 17) Apply concepts related to the basic cellular and biochemical processes in plants to demonstrate the following:
 - a. Create a graphic illustration of the parts and functions of plant cells
 - b. Use quantitative reasoning to balance chemical equations related to plant processes
 - c. Interpret the role of physics within the cohesion-tension theory and its significance to plant life
 - d. Examine the roles of photopigments and the effects of different colors of light on plant growth
- 18) Formulate a hypothesis about the correlation between plant nutrient deficiencies and soil composition. Conduct basic soil analysis to determine the chemical elements and nutritional levels available in soils essential for plant growth. Draw conclusions about the ability of soils to meet the nutritional requirements of plants.

Reproductive Systems

- 19) Research and develop illustrative models that compare and contrast the reproductive structures of plants, drawing out key differences between sexual and asexual reproduction processes.

- 20) Describe the structure and function of different seed components and summarize their roles in plant reproduction and propagation.
- 21) Describe the structures and functions of the male and female animal reproductive systems. Compare and contrast the differences of the reproductive systems between small and large animal species.

Principles of Power and Energy

- 22) Apply fundamental principles of physics as they relate to agricultural power and technology concepts in order to demonstrate the following:
- Analyze the relationship between speed, distance, and time
 - Relate the types of simple machines to the law of machines and mechanical advantages
 - Specify groups, sources, and forms of energy
 - Analyze the principle of heat energy and describe the way heat travels
 - Explain the law of conservation of energy
 - Explain the production of energy and relate it to the invisible light spectrum

Fundamentals of Electricity

- 23) Identify different methods by which electrical energy can be produced. Discuss the safety hazards involved in each method as well as prevention and control methods relevant to electrical power supplies. Justify the use of different precautions for the prevention or management of electrical hazards and evaluate the efficacy of the prevention measures.
- 24) Utilize the appropriate instruments needed to calculate and measure voltage, amperage, resistance, and wattage.

Fundamentals of Engines

- 25) Apply basic principles of thermodynamics to analyze the function of major components of gasoline and diesel fuel engines.
- 26) Using quantitative reasoning and employing appropriate unit conversions, calculate horsepower and thermal efficiency in internal combustion engines by creating systems of equations that describe numerical relationships.

Standards Alignment Notes

References to other standards include:

- SAE: [Supervised Agricultural Experience](#): All Agriculture students are encouraged to participate in a Supervised Agricultural Experience program to practice and demonstrate the knowledge and skills learned in their agriculture courses.

- AFNR: [National Agriculture, Food, & Natural Resources \(AFNR\) Career Cluster Content Standards](#): Students who are engaging in activities outlined above should be able to demonstrate fluency in Standards AS, CS, and PS at the conclusion of the course.
- P21: Partnership for 21st Century Skills [Framework for 21st Century Learning](#)
 - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.