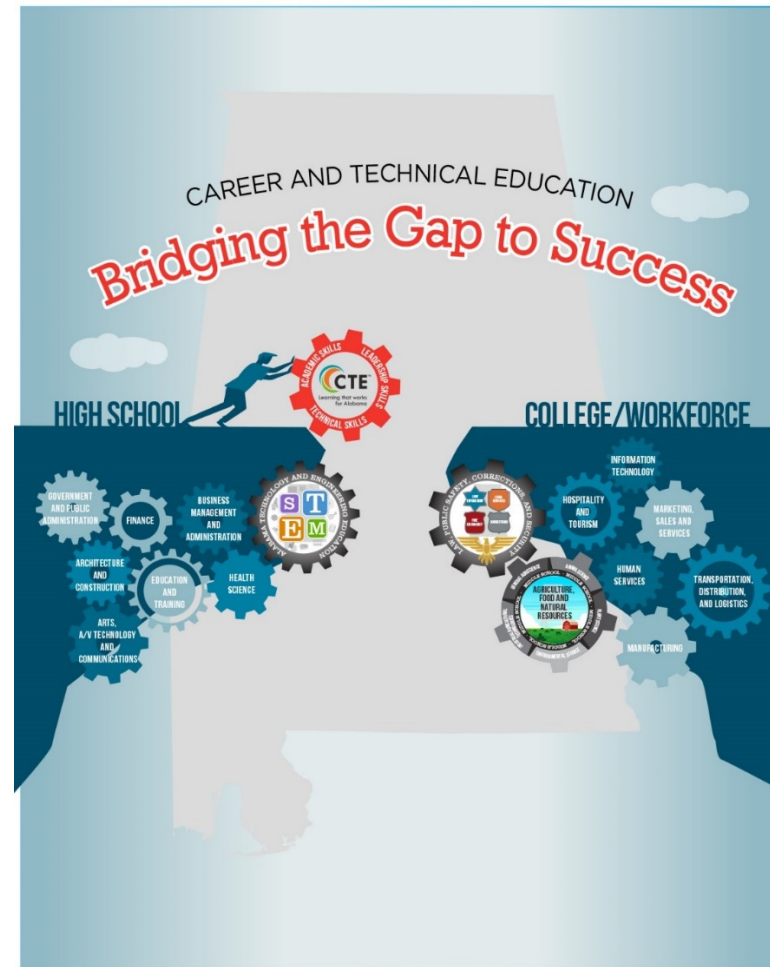


2020 Alabama Course of Study Career and Technical Education



Eric G. Mackey, State Superintendent of Education
Alabama State Department of Education



For information regarding the
Alabama Course of Study: Career and Technical Education
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2020 Alabama Course of Study: Agriculture, Food, and Natural Resources

2020 Alabama Course of Study Agriculture, Food, and Natural Resources



Eric G. Mackey
State Superintendent of Education

**STATE SUPERINTENDENT
OF EDUCATION'S
MESSAGE**

Dear Educator:

The Agriculture, Food, and Natural Resources (AFNR) career cluster of Career and Technical Education represents diverse career pathways in General Agriculture, Animal Science, Environmental Science, Industrial Agriculture, and Plant Science. In all these programs, courses are project-based and process-oriented, and they promote opportunities for work-based learning.

The *2020 Alabama Course of Study: Career and Technical Education*, AFNR presents standards designed to address the challenge of ensuring that agricultural studies continue to be relevant in a changing, technological, diverse, and global society. Agriculture is a diverse industry that contributes over \$70 billion annually to Alabama's economy. Therefore it is imperative for students to develop their abilities to analyze, communicate, manage, and lead within this industry. This document contains challenging standards designed to promote students' engagement and interest in AFNR career fields. I encourage each system to use the document to develop local curriculum guides to determine how their students will achieve and even exceed these standards.

The *2020 Alabama Course of Study: Career and Technical Education*, AFNR was developed by educators and business and community leaders to provide a foundation for building quality AFNR programs across the state. Implementing its content through appropriate instruction will promote students' exploration and engagement in AFNR content and prepare them for further study and careers in a variety of vital fields.

Eric G. Mackey
State Superintendent of Education

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2020 Alabama Course of Study: Agriculture, Food, and Natural Resources Table of Contents

PREFACE	viii
ACKNOWLEDGMENTS	ix
GENERAL INTRODUCTION.....	1
CONCEPTUAL FRAMEWORK.....	2
AGRICULTURE, FOOD, AND NATURAL RESOURCES INTRODUCTION.....	4
POSITION STATEMENTS	6
DIRECTIONS FOR INTERPRETING STANDARDS.....	10
AGRICULTURE, FOOD, AND NATURAL RESOURCES CLUSTER OVERVIEW	12
AGRICULTURE, FOOD, AND NATURAL RESOURCES MINIMUM REQUIRED CONTENT	
ORIENTATION TO AGRISCIENCE	14
AGRISCIENCE EXPLORATION	17
PRE-AGRISCIENCE	20
ADVANCED AGRISCIENCE	24
AGRIBIOLOGY	28
AGRICULTURAL AND BIOSYSTEMS ENGINEERING	31
AGRICULTURAL COMMUNICATIONS AND TECHNOLOGY.....	36
AGRICULTURAL ENGINES	39
AGRICULTURAL INDUSTRIAL MAINTENANCE.....	43
AGRICULTURAL WELDING I.....	47
AGRICULTURAL WELDING II	51
AGRICULTURAL MARKETING AND MANAGEMENT	54

APPLIED AGRISCIENCE	57
AQUACULTURE SCIENCE	61
AQUATIC BIOLOGY	65
CAREER PATHWAY PROJECT IN AGRICULTURE, FOOD AND NATURAL RESOURCES.....	68
CONSTRUCTION FINISHING AND INTERIOR SYSTEMS	72
CONSTRUCTION FRAMING	77
CONSTRUCTION SITE PREPARATION AND FOUNDATIONS	81
CTE LAB IN AGRICULTURE, FOOD AND NATURAL RESOURCES	84
DENDROLOGY	87
ENVIRONMENTAL MANAGEMENT.....	90
EQUINE SCIENCE	94
FISH AND WILDLIFE MANAGEMENT.....	98
FLORICULTURE AND FLORAL DESIGN	102
FOOD SAFETYAND MICROBIOLOGY	106
FORESTRY	110
FORESTRY INDUSTRIAL MAINTENANCE.....	114
FUNDAMENTALS OF AGRISCIENCE.....	118
GREENHOUSE AND NURSERY PRODUCTION.....	123
HORTICULTURE SCIENCE	126
INTERMEDIATE AGRISCIENCE	130
INTRODUCTION TO AGRICULTURAL CONSTRUCTION	134
INTRODUCTION TO AGRICULTURAL WIRING.....	139
INTRODUCTION TO ANIMAL AND DAIRY SCIENCE	143
INTRODUCTION TO VETERINARY SCIENCE.....	146
LANDSCAPE DESIGN AND MANAGEMENT.....	149
PLANT BIOTECHNOLOGY	153
POULTRY INDUSTRIAL MAINTENACE.....	157

POULTRY SCIENCE.....	160
RESIDENTIAL AND COMMERCIAL POWER EQUIPMENT	164
TURFGRASS MANAGEMENT.....	167
URBAN FORESTRY	170
VETERINARY SCIENCE	173
WILDLAND FIREFIGHTING AND CONTROLLED FIRE	178
APPENDIX A.	
RESOURCES	182
APPENDIX B.	
ALABAMA HIGH SCHOOL GRADUATION REQUIREMENTS	183
APPENDIX C.	
GUIDELINES AND SUGGESTIONS FOR LOCAL TIME REQUIREMENTS AND HOMEWORK	184
BIBLIOGRAPHY	186
GLOSSARY	188

2020 Alabama Course of Study: Agriculture, Food, and Natural Resources

PREFACE

The *Alabama Course of Study: Career Technical Education, Agriculture, Food, and Natural Resources* provides the framework for Grades 6-12 Agriculture, Food, and Natural Resources (AFNR) education in Alabama's public schools. Content standards in this document are minimum and required (Code of Alabama, 1975, §16-35-4), fundamental and specific, but not exhaustive. Agriculture, Food, and Natural Resources courses are organized by pathways, which are aligned with national standards. When developing local curriculum, school systems may include additional content standards to reflect local needs and philosophies and may add implementation guidelines, resources, and activities.

In developing the minimum required content for AFNR education, the 2019-2020 Career and Technical Education Course of Study Committee and Task Force made extensive use of previous Alabama career/technical courses of study, as well as national standards documents and certification standards.

In addition, Committee and Task Force members reviewed information found in professional journals, Internet sites, and similar documents from other states. The Committee and Task Force attended state and national conferences, listened to and read suggestions from interested individuals and agricultural industry advisors throughout Alabama, considered suggestions from independent reviewers, sought input from advisory councils, and thoroughly discussed each issue and standard among themselves. The Committee and Task Force reached consensus and developed what members believe to be the best Agriculture, Food, and Natural Resources Course of Study for students in Alabama's public schools.

2020 Alabama Course of Study: Agriculture, Food, and Natural Resources

ACKNOWLEDGMENTS

This document was developed by the Agriculture, Food, and Natural Resources Committee and Task Force of the 2020 Alabama Career and Technical Education Course of Study Committee and Task Force, composed of middle school, high school, and college educators appointed by the Alabama State Board of Education and business and professional persons appointed by the Governor (*Code of Alabama*, 1975, §16-35-1). The Committee and Task Force began work in March of 2019 and submitted the document to the Alabama State Board of Education for adoption at the April 2020 meeting.

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2020 Alabama Course of Study: Career and Technical Education

GENERAL INTRODUCTION

Alabama's Career and Technical Education programs empower students with the workplace-readiness skills necessary for success in the 21st Century. As a result, students are productive citizens who are prepared with the necessary knowledge and skills for postsecondary education and employment. Career and technical education provides opportunities for students to combine core academic content with rigorous and relevant technical knowledge and skills.

The *2020 Alabama Course of Study: Career and Technical Education* is intended for all students in Grades 6-12. Alabama's career and technical education programs promote students' career awareness through engaging career exploration and development activities. Career and Technical Education programs focus on providing students with the knowledge and skills that reinforce attainment of academic core content through hands-on experiential learning. These programs are organized into the **sixteen national career clusters** identified by the United States Department of Education, which arrange instruction into groups of similar occupations. Within the sixteen national career clusters, separate course content standards have been developed for more than fifty career pathways.

Alabama's Career and Technical Education programs are designed to keep abreast of the rapid changes in business and industry and be responsive to the current and future workforce demands. Rigor in each course of study is derived from core academic content and industry-specific knowledge and skills required for students to achieve, maintain, and advance in employment in a particular career pathway. The level of academic and workplace rigor determines the degree to which each Alabama Career and Technical Education program prepares students for high-skill, high-wage, and in-demand careers. For each career and technical education program, industry-recognized credentials of value and certifications have been established that validate the rigor of the curriculum to students, parents, and members of business and industry. In addition, articulation agreements are developed in partnership with the Alabama Community College System to allow for a seamless transition for students to further their education.

Alabama's growing economy has created the demand for more highly-skilled workers. Alabama's Career and Technical Education programs, through the implementation of each career cluster's course of study, equip students with the employability skills and technical knowledge necessary to meet current and future workforce demands by preparing them for lifelong learning.

2020 Alabama Course of Study: Agriculture, Food, and Natural Resources CONCEPTUAL FRAMEWORK



2020 Alabama Course of Study: Agriculture, Food, and Natural Resources

CONCEPTUAL FRAMEWORK

The conceptual framework pictured on the previous page is a graphic representation of the broad, challenging, and fascinating field of Agriculture, Food, and Natural Resources.

Listed around the circumference of the gear are the five pathways of this cluster: General Agriscience, Animal Science, Plant Science, Environmental and Natural Resources, and Industrial Agricultural Technology. Each pathway is aligned with one of the teeth of the gear, which allow it to interlock with other gears in the Career and Technical Education system. The inner ring of the gear is the middle school component of the pathway, which can introduce students to studies in the AFNR field.

The pictures in the center represent the facilities, machinery, crops, livestock, and natural resources that are the heart of the Agriculture, Food, and Natural Resources cluster. The diversity of these resources is a source of strength for the state and its citizens, represented by the shaded map of Alabama in the background. The rising sun, which provides light and energy, represents the role of FFA in enhancing Agriculture, Food, and Natural Resources in Alabama.

The Agriculture, Food, and Natural Resources cluster promotes objects and processes that sustain life for every person on the planet. Its importance cannot be overstated.

2020 Alabama Course of Study: Agriculture, Food, and Natural Resources

INTRODUCTION

The Agriculture, Food, and Natural Resources cluster contains five pathways: General Agriscience, Animal Science, Plant Science, Environmental and Natural Resources, and Industrial Agricultural Technology. Specific content standards describe what students should know and be able to do at the end of each course. Middle and junior high school courses, offered in Grades 6, 7, and 8, introduce students to all pathways and provide an introductory overview of the agriculture industry as a whole. The Grades 9-12 foundational course, Fundamentals of Agriscience, is considered a gateway to all pathways. All students are encouraged to complete Fundamentals of Agriscience before selecting and pursuing a specific pathway.

Students who select a pathway in the Agriculture, Food, and Natural Resources cluster are interested in the planning, implementation, production, management, or marketing of agriculture, food, and natural resources.

While all courses in Grades 9-12 can be offered as one-credit courses (140 hours), some may also be offered as half-credit courses (70 hours). Some courses have prerequisites, which are noted in the overview boxes at the beginning of each course. Courses in the General Agriscience pathway offer a broad overview of agriculture and related industries. The Animal Science pathway offers a variety of coursework related to animal breeding and genetics, nutrition, physiology, growth, behavior and management. Courses in the Plant Science pathway provide a scientific understanding of how plants grow and develop in managed ecosystems and how plant products are utilized for food, fiber, fuel, and environmental enhancements. Courses in the Environmental Science pathway encompass waste management, natural resource management, soil science, environmental quality management and monitoring, and the impact of human activity on natural systems related to stewardship and conservation. The Industrial Agricultural Technologies pathway prepares students for careers in construction, industrial maintenance, plumbing, electrical, metalworking, basic engineering, mechanics, and repair and maintenance.

Students in grades 6-12 possess varying levels of maturity as well as an array of learning styles. Their backgrounds include diverse family structures and varying social and emotional environments. Throughout these grades, students are adjusting to personal, physical, and emotional changes as well as to social changes taking place in the world around them.

Instruction in the Agriculture, Food, and Natural Resources cluster provides students with the essential knowledge, high-level workplace and life skills, and training demanded for work, career, and college placement in this cluster. Learning activities simulate work environments students may encounter, which include opportunities to gain knowledge and skills through coordinated work-based, service, and project-based learning experiences such as entrepreneurial, on-site visits and work shadowing. The classroom and laboratory for this cluster provides a safe and appropriate setting for active, structured, and stimulating student learning and assessment.

The National FFA Organization, the Career and Technical Student Organization (CTSO) most closely related to the Agriculture, Food, and Natural Resources (AFNR) cluster, is an integral, co-curricular component of each agriscience education course. This organization serves as a means to enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and broaden opportunities for personal and professional growth.

POSITION STATEMENTS

AGRICULTURE, FOOD, AND NATURAL RESOURCES

Classroom and Laboratory Environment

The effective career and technical education classroom is equipped with current and emerging technologies and other supplies and materials representative of the content area. In such a classroom, students and teachers utilize equipment to enhance a variety of classroom instruction and learning activities. The career and technical education classroom environment is unlimited and encompasses more than the traditional four walls of the classroom. Students and teachers should have access to laboratory environments on and off campus that provide students with practical and real-world experiences in the industry represented.

Technology, Equipment, and Facilities

Adequate classroom equipment must be available, maintained, and upgraded according to a regularly scheduled plan. In addition, other classroom supplies and materials such as textbooks, reference materials, and software should be readily available for student use to support instruction, including access to classroom libraries, reading and research areas, and material centers. Maintaining up-to-date technology enhances students' learning and readies them for future career opportunities. Sufficient funds must be allocated to support the technology and materials necessary for a superior career and technical education program. Facilities include but are not limited to agricultural mechanics and construction shops, greenhouses, hoop houses, high tunnels, school farms, and/or school/community gardens.

Safety

Student safety is a prime consideration in any location of the learning environment. A written safety plan is an essential part of planning, implementing, and evaluating each career and technical education program. An effective plan may include federal, state, local, school, and program guidelines. Students are required to pass safety tests with one-hundred percent accuracy.

Professional Development

As technology and instructional methods continue to change, it is essential for teachers to take advantage of professional development and technical training opportunities to stay abreast of current trends and methods pertaining to their content area and the industry represented. Teachers who continually expand their knowledge and skills are able to adjust the learning environment to reflect current and emerging trends in teaching methods and learning styles. Regular assessment by students, educators, administrators, and business and industry also strengthens the instructional program and enhances professional development.

Administrative Support

Administrative support is essential in providing the necessary components for a successful career and technical education program. Administrators should recruit highly qualified teachers who possess appropriate credentials. Time must be provided for professional development activities and for planning for integration of academic content areas into the AFNR cluster. Funding must be secured for professional development programs and for industry certification for teachers. In addition, administrators should actively participate in marketing the career and technical education programs within the school and within the community.

Instructional Model

In the career and technical education classroom, it is imperative that students apply knowledge, skills, and ideas to solve problems and make decisions. The AFNR course of study is designed to address the challenges of a changing, technological, diverse, and global society. Students develop their abilities to analyze, communicate, manage, and lead. The AFNR curriculum should be project-based, process-oriented, and work-based.

The rigorous content standards contained in this document require students to use innovative, critical-thinking skills. Utilization of this document requires teachers to identify the issue or concern addressed in a specific content standard and then to plan appropriate learning experiences. These experiences should be project-based and require higher-order thinking, communication, management, and leadership skills.

The AFNR curriculum should emphasize the integration of academics. To achieve the solution to a given problem, students must possess an adequate foundation in communication skills for reading, writing, speaking, listening, viewing, and presenting; knowledge and skills in mathematics, science, and social studies; and knowledge of current and emerging technologies.

The AFNR curriculum should emphasize the integration of workplace demands, essential, and/or soft skills where students' individual learning styles and interests require the use of various instructional strategies. Individual needs of students must be determined by a variety of assessments that evaluate interests, aptitudes, and abilities. Once individual needs have been determined for special populations, a support service program should be planned cooperatively with the career and technical education teacher and other appropriate personnel. Individual education plans are more effective when developed with career and technical education instructors. Courses and equipment may be tailored to ensure equal access to the full range of learning experiences and skill development in the AFNR curriculum.

Student Organizations

Nationally affiliated student organizations such the National FFA Organization are an integral part of classroom instruction in each career and technical education program. FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education. The focus of these organizations is to help students develop an understanding of all aspects of industry and technology in the program areas while learning teamwork and leadership skills. Goals of student organizations include:

- developing individual potential;
- developing effective leadership and citizenship skills through social, economic, scholastic, and civic activities;
- increasing knowledge and understanding of an ever-changing society;
- assisting in the exploration of occupational choices and the development of essential workplace skills;
- participating in career development events; and
- serving the school and community through FFA projects.

Business-Industry-School Relationships

Certification

Maintaining relationships with local businesses and industries is vital to the Career and Technical Education program certification process as well as to federal funding through the Carl D. Perkins legislation. Certain elements of program certification require local industries to participate in the Career and Technical Education program's adoption of industry standards. Representatives from local businesses and industries interact with school programs to address the ever-changing needs of the competitive global economy. From

this interaction, program structure is reviewed to ensure that needs are being met through lesson plans, instructional techniques, facilities, professional development, technical updates, equipment, and implementation of CTSOs.

Student Work Experience

As students begin to plan careers, they must have opportunities to visit, tour, and work at local industries and businesses. Real-world experiences such as cooperative education, internships, apprenticeships, job shadowing, and Supervised Agricultural Experience (work-based, service-based, and project-based learning) are beneficial to enhance classroom learning. Continuous feedback from students and supervisors provides further assessment of the program and facilitates changes necessary to satisfy industry needs.

Advisory Councils and Partnerships

In accordance with Alabama Department of Education guidelines, each career and technical education program has an advisory council that will provide opportunities to establish partnerships as a means for professional input regarding equipment needs, curriculum emphasis, technical updates, and problem solving. This external support is a necessary link to business and industry for the potential acquisition of equipment, resource materials, community support, and qualified speakers. These resources include judges for student career development events, program sponsors, financial support, scholarships, field trip sites, and other program needs.

Community Involvement and Service

There are many ways students and teachers become involved with community and service projects. Mentoring activities may include teacher-to-teacher, teacher-to-student, student-to-student, student-to-community resident, and community member-to-students-and-teacher. Local organizations such as community civic clubs, professional educational organizations, youth organizations, and community adult education organizations are valuable resources for career and technical education programs. Open houses, tours, and presentations provide families and other interested citizens with opportunities to become more involved in the education environment.

Postsecondary and Higher Education Credit

Postsecondary and higher education articulation is a significant element in a student's career cluster. Secondary and postsecondary instructors must communicate on a regular basis to ensure a smooth transition for students and to ensure students are aware of articulation opportunities. Articulation may occur through program alignment with postsecondary programs, early college enrollment, or dual enrollment programs. Students benefit in a variety of ways when cooperation exists between secondary and postsecondary institutions. One of the benefits is the earning of postsecondary credit in conjunction with work completed while the student is still in secondary

school. Postsecondary teachers offer additional benefits by serving as guest speakers, donating equipment, sharing expertise through professional development activities, and addressing other needs appropriate for the school community.

Dual Enrollment for Dual Credit is an enrichment opportunity allowing eligible high school students to earn high school and college credits for courses taken through an Alabama Community College System (ACCS) institution or Alabama College/university while still enrolled in high school.

Credit is awarded when a student enrolls in a post-secondary institution that has an articulation agreement with that student's participating school.

Directions for Interpreting Standards

The *2020 Alabama Course of Study: Agriculture, Food, and Natural Resources* is organized around the following elements: foundational standards, topics, and content standards.

Foundational standards are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab.

Topics group related content standards. In the example below, the topic is "Impact of Agriculture." Standards from different topics may be closely related.

Content Standards contain the minimum required content and define what students should know or be able to do at the conclusion of a course. Some have sub-standards, indicated with a, b, c, d, which are extensions of the content standards and are also required. Some standards are followed by examples, which are not required to be taught. The order in which standards are listed within a course or grade is not intended to convey a sequence for instruction. Each content standard completes the stem "*Students will...*"

The course of study does not dictate curriculum, teaching methods, or sequence. Each local education authority should create its own curriculum and pacing guide based on the Course of Study. LEAs may add standards to meet local needs and incorporate local resources. Even though one topic may be listed before another, the first topic does not have to be taught before the second. A teacher may choose

to teach the second topic before the first; to teach both at the same time to highlight connections; or to select a different topic that leads to students reaching the standards for both topics.

<i>Topic</i>	<i>Standard Number</i>	<i>Content Standard</i>
Impact of Agriculture	1.	Define <i>agriculture</i> and identify major divisions of the agriculture industry. a. Identify major agricultural commodities in the local area, state, nation, and world. b. Describe various agricultural organizations and their roles in the agricultural industry.

Sub-Standard

Alabama Course of Study: Agriculture, Food, and Natural Resources

Cluster Overview

In the Agriculture, Food, and Natural Resources cluster, students choose one of five pathways— General Agriculture, Animal Science, Plant Science, Environmental and Natural Resources, and Industrial Agriculture. Students choose courses leading through specific pathways, as shown in the table on the next page. Content standards in each course identify what students should know or be able to do at the end of the course.

Hands-on training is especially important in the Agriculture, Food, and Natural Resources cluster. Students gain knowledge and skills through an active, structured, and stimulating classroom environment which is augmented by simulated workplace learning experiences, including on-site visits and work shadowing. Agriculture, Food, and Natural Resources classrooms and laboratories provide safe and appropriate settings where students can learn and practice their skills. Also, students can also be assessed in a meaningful way in these simulated workplace settings.

Students in Agriculture, Food, and Natural Resources often affiliate with FFA, a career and technical student organization (CTSO). This organization enhances classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and take advantage of opportunities for personal and professional growth.

Students in Grades 6-12 possess varying learning styles and levels of maturity. Their backgrounds include diverse family structures and varying social and emotional environments. Throughout these grades, students are adjusting to personal, physical, and emotional changes as well as to social changes taking place in the world around them as they tackle challenging academic requirements and opportunities.

Course of Study standards represent the minimum required content and are not intended to be the course curriculum. LEAs and local schools should use these standards to create a curriculum that utilizes available resources to meet the specific needs and interests of the local community. Teachers are encouraged to adapt and make use of appropriate FFA Career Development Event and Leadership Development Event resources in teaching courses. All Career and Technical Education courses emphasize application of knowledge and skills to solve practical problems.

High School Program



Agriculture, Food, and Natural Resource Cluster Program Grid

Middle School Program

- Orientation to Agriscience
 - 6th Grade Agriscience
- Agriscience Exploration
 - 7th Grade Agriscience
- Pre Agriscience
 - 8th Grade Agriscience
- Fundamentals of Agriscience
- CTE Lab in AFNR

General Agriculture

- Fundamentals of Agriscience
- Intermediate Agriscience
- Advanced Agriscience
- Applied Agriscience
- AgriBiology
- Agricultural and Biosystems Engineering
- Agriculture Communications and Technology
- Agricultural Industrial Maintenance
- Agriculture Marketing and Management
- Career Pathway Project in AFNR
- CTE Lab in AFNR
- Food Safety and Microbiology
- Forestry Industrial Maintenance
- Poultry Industrial Maintenance

Animal Science

- Fundamentals of Agriscience
- Agricultural and Biosystems Engineering
- AgriBiology
- Agricultural Industrial Maintenance
- Aquaculture Science
- Aquatic Biology
- Career Pathway Project in AFNR
- CTE Lab in AFNR
- Equine Science
- Food Safety and Microbiology
- Introduction to Veterinary Science
- Introduction to Animal and Dairy Science
- Poultry Industrial Maintenance
- Poultry Science
- Veterinary Science

Plant Science

- Fundamentals of Agriscience
- Agricultural and Biosystems Engineering
- AgriBiology
- Agricultural Industrial Maintenance
- Career Pathway Project in AFNR
- CTE Lab in AFNR
- Dendrology
- Floriculture and Floral Design
- Food Safety and Microbiology
- Forestry
- Forestry Industrial Maintenance
- Greenhouse and Nursery Production
- Horticulture Science
- Landscape Design and Management
- Plant Biotechnology
- Turfgrass Management
- Urban Forestry

Environmental and Natural Resources

- Fundamentals of Agriscience
- Agricultural and Biosystems Engineering
- Agricultural Industrial Maintenance
- Career Pathway Project in AFNR
- CTE Lab in AFNR
- Dendrology
- Environmental Management
- Fish And Wildlife Management
- Forestry
- Forestry Industrial Maintenance
- Urban Forestry
- Wildland Firefighting and Controlled Fire

Industrial Agriculture

- Fundamentals of Agriscience
- Agricultural Engines
- Agricultural and Biosystems Engineering
- Agricultural Industrial Maintenance
- Agricultural Welding 1
- Agricultural Welding 2
- Career Pathway Project in AFNR
- Construction Finishing and Interior Systems
- Construction Framing
- Construction Site Prep and Foundations
- CTE Lab in AFNR
- Forestry Industrial Maintenance
- Introduction to Agricultural Construction
- Introduction to Agricultural Wiring
- Poultry Industry Maintenance
- Residential and Commercial Power Equipment

Agriculture, Food, and Natural Resource Course Listing

Orientation to Agriscience – 6th Grade Agriscience
 Agriscience Exploration – 7th Grade Agriscience
 Pre Agriscience – 8th Grade Agriscience
 Advanced Agriscience
 Agribiology
 Agricultural and Biosystems Engineering
 Agriculture Communications and Technology
 Agricultural Engines
 Agricultural Industrial Maintenance

Agricultural Welding 1
 Agricultural Welding 2
 Agriculture Marketing and Management
 Applied Agriscience
 Aquaculture Science
 Aquatic Biology
 Career Pathway Project in AFNR
 Construction Finishing and Interior Systems
 Construction Framing
 Construction Site Prep and Foundations
 CTE Lab in AFNR
 Dendrology

Environmental Management
 Equine Science
 Fish And Wildlife Management
 Floriculture and Floral Design
 Food Safety and Microbiology
 Forestry
 Forestry Industrial Maintenance
 Fundamentals of Agriscience
 Greenhouse and Nursery Production
 Horticulture Science
 Intermediate Agriscience
 Introduction to Agricultural Construction

Introduction to Agricultural Wiring
 Introduction to Animal and Dairy Science
 Introduction to Veterinary Science
 Landscape Design and Management
 Plant Biotechnology
 Poultry Industrial Maintenance
 Poultry Science
 Residential and Commercial Power Equipment
 Turfgrass Management
 Urban Forestry
 Veterinary Science
 Wildland Firefighting and Controlled Fire

Orientation to Agriscience	
Course Duration	9 weeks (Content standards 2, 3, 4, 9, and 11 are required) OR 1 semester (Content standards 2, 3, 4, 7, 9, 10, 11, and 12 are required) OR 1 year (All content standards are required)
Grade Level (s)	6
Prerequisite(s)	

Orientation to Agriscience is an exploratory course that provides an overview of the basics of the agriculture industry. Topics include the importance of agriculture, the history and purpose of agriculture education, ecology and conservation, animal science, plant science, and agricultural mechanics. Educators may choose to incorporate additional standards to build upon those which are required.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Orientation to Agriscience Content Standards

Each content standard completes the stem “*Students will...*”

The Importance of Agriculture	<ol style="list-style-type: none"> 1. Describe the impact of agriculture on daily life. <ol style="list-style-type: none"> a. Identify sources of different types of food and fiber. b. Describe how advancements in agriculture have impacted today’s society. c. Describe the importance of agriculture to Alabama’s economy. d. Identify Alabama’s important agricultural commodities and explain their impact on the state and the local community.
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Introduction to Agriculture Education	<ol style="list-style-type: none"> 2. Explain the history, mission, components, and benefits of FFA. <ol style="list-style-type: none"> a. Identify and explain the parts of the three-circle agricultural education model. b. Describe and identify examples of project-based learning through Supervised Agricultural Experiences (SAEs). c. Describe the various Career Development Events (CDEs), Talent Development Events (TDEs), and Leadership Development Events (LDEs) that are available through the National FFA Organization. d. Define leadership and identify opportunities for leadership development and personal growth in FFA.
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Plant Science

3. Identify plant structures.
4. Differentiate between sexual and asexual reproduction in plants.
5. Describe the four major components of soil, including organic and mineral matter.
6. Obtain and communicate information about basic nutrition requirements of plants, including nitrogen (N), phosphorus (P), and potassium (K).

Animal Science

7. Define and utilize key terms in the study of animal science.
8. Identify the roles and economic benefits of livestock and companion animals.
 - a. Identify products and by-products obtained from livestock.

Ecology and Conservation

9. Explain the relationship between agriculture and the conservation of natural resources.
 - a. Identify and categorize natural resources.
 - b. Differentiate between renewable and nonrenewable resources.
10. Discuss the importance of water quality.
 - a. Obtain and communicate information about ways to conserve water.

Agriculture Mechanics

11. Explain why safety is important in the agriculture mechanics lab.
12. Identify common hand tools used in woodworking and demonstrate proper and safe use.
13. Identify common types and sizes of wood fasteners and tell when each would be used.

Examples: wood glue, nails, screws

Agriscience Exploration	
Course Duration	9 weeks (Content standards 1, 3, 5, 13, and 15 are required) OR 1 semester (Content standards 1, 2, 3, 5, 10, 13, 15, and 21 are required) OR 1 year (All standards are required)
Grade Level(s)	7
Prerequisites(s)	

Agriscience Exploration is an exploratory course that provides an expanded overview of the agriculture industry. Topics include environmental science, animal science, plant science, drafting, and wood technology. The educator may choose to incorporate additional standards to build upon those which are required.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Agriscience Exploration Content Standards

Each content standard completes the stem “*Students will...*”

FFA/Leadership Development	<ol style="list-style-type: none"> 1. Summarize the history of the National FFA organization. 2. Explain the degrees and types of FFA membership.
Supervised Agricultural Experience (SAE)	<ol style="list-style-type: none"> 3. Explain the types of Supervised Agricultural Experience (SAE) projects. 4. Demonstrate proper record-keeping through an electronic format for an SAE project.
Health and Safety	<ol style="list-style-type: none"> 5. Describe the importance of using personal protective equipment (PPE) in the lab/shop. 6. Demonstrate proper use of personal protective equipment (PPE) with specific power tools. 7. Explain the importance of maintaining a clean work environment.
Drafting	<ol style="list-style-type: none"> 8. Describe ways drafting is used in relation to agriculture. 9. Identify basic drafting tools and their functions. <ol style="list-style-type: none"> a. Use whole numbers and fractions on a ruler to measure accurately. b. Identify different types of lines used in drawings. <i>Examples: extension, dimension, hidden lines</i>

Wood Technology	<p>10. Identify basic woodworking hand tools.</p> <p>11. Discuss the proper safety procedures for using each of the basic woodworking hand tools.</p> <p>12. Demonstrate the proper techniques for sanding and finishing wood.</p>
Animal Science	<p>13. Describe the economic importance of domesticated animals.</p> <p>14. Identify the most common breeds of domesticated agricultural animals in the specific local area.</p>
Plant Science	<p>15. Investigate the role plants have in today's society.</p> <p>16. Compare and contrast methods of plant reproduction, including sexual and asexual.</p> <p>17. Explain the importance of seeds in plant reproduction.</p> <p>18. Explain the impact of soil pH on plant growth.</p>
Environmental Science and Natural Resources	<p>19. Explain why it is important to protect and maintain natural resources.</p> <p>20. Identify renewable and nonrenewable resources found in the local community.</p>
Technology in Agriculture	<p>21. Obtain, evaluate, and share information about changes in agricultural technology over the past decade.</p> <p><i>Examples: precision farming, GPS, GIS, methods of increasing productivity of plant and animal systems</i></p>

Pre-Agriscience	
Course Duration	9 weeks (Content standards 1, 7, 11, 18, 21, 27, 29, and 31 are required) OR 1 semester (Content standards 1, 6, 7, 10, 11, 12, 13, 18, 19, 21, 22, 27, 29, 30, and 31 are required) OR 1 year (All standards required)
Grade Level(s)	8
Prerequisites(s)	

Pre-Agriscience is an exploratory course that provides students the opportunity to gain knowledge and acquire skills relating to the agricultural industry. It may be offered as a component of a course rotation allowing students to explore different career fields. Topics include animal science, plant science, forestry and natural resources, leadership in the FFA, and Supervised Agriculture Experience. Instruction also focuses on agriscience technologies in the areas of woodworking, electricity, and power mechanics. Educators may choose to incorporate additional standards to build upon those which are required.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
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	<ol style="list-style-type: none"> 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Pre-Agriscience Content Standards

Each content standard completes the stem “*Students will...*”

Animal Science	<ol style="list-style-type: none"> 1. Define and utilize terminology related to animal science. 2. Identify requirements for optimal animal health. 3. Describe signs of poor health in animals. 4. Explain the proper methods for handling and restraining large and small animals. 5. Identify the proper foods to meet the nutritional needs of livestock. 6. Evaluate desirable characteristics based on breed standards of specific companion animals and/or livestock.
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Plant Science	<ol style="list-style-type: none"> 7. Define and utilize terminology related to plant science. 8. Demonstrate sexual and asexual propagation of plants. 9. Describe the requirements for optimal plant growth. 10. Identify major parts of plants and their functions.
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**Forestry and
Natural
Resources**

11. Identify major forest products used in everyday life.
12. Identify parts of a tree and explain the functions of each part.
13. Compare and contrast hardwood and softwood species of trees.
14. Discuss the relationships of plant and animal populations within a habitat to communities, ecosystems, and biomes.
15. Compare biotic and abiotic components of an ecosystem.
16. Identify factors that limit plant and animal populations in an ecosystem.
17. Explain the importance of forest management practices.

**Agriscience
Woodworking/
Agricultural
Mechanics**

18. Discuss the proper safety rules for using power tools in the lab/shop.
19. Identify basic portable power hand tools.
20. Demonstrate correct sanding and finishing of wood using power tools.

**Basic
Electricity**

21. List safe practices for working with electricity.
22. Explain how electricity is produced.
23. Explain the electron theory and its relevance to electrical circuitry.
24. Explain the relationship between electricity and magnetism.
25. Describe electrical terms, units, and symbols.
26. Demonstrate techniques for making electrical circuits.

Power Mechanics and Small Engines	<p>27. List safety rules related to the operation and maintenance of small gasoline engines.</p> <p>28. Discuss the importance of routine care and maintenance of small gasoline engines.</p>
Advances in Technology	<p>29. Explore how advancements in technology benefit productivity in agriculture.</p>
Leadership Development/ FFA	<p>30. Discuss the need for a well-defined FFA Program of Activities (POA).</p> <p>31. Describe the three-circle model of an agriscience education program.</p>

Advanced Agriscience	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisites(s)	

Advanced Agriscience provides students with an increased understanding of Animal Science, Industrial Agricultural Technologies, and General Agriculture, three of the five pathways of the Agriculture, Food, and Natural Resources cluster. Students are involved in classroom and laboratory activities in each area. Advanced Agriscience emphasizes animal science and industrial agricultural technologies.

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Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Advanced Agriscience Content Standards

Each content standard completes the stem “*Students will...*”

Impact of Agriculture	<p>1. Describe the impact of agricultural commodities on Alabama’s livestock industry, including feed, animal products, and by-products.</p> <p><i>Examples: legumes, cotton seed, grains</i></p>
Technology Applications	<p>2. Assess agriculture record keeping systems utilizing electronic record-keeping software.</p> <p><i>Example: Agriculture Experience Tracker (AET)</i></p> <p>3. Compare and contrast various technologies that have enhanced the agriculture industry.</p> <p><i>Examples: microchipping, tagging, electronic control systems, drones, Global Positioning System (GPS), Geographic Information System (GIS)</i></p>
Agribusiness Leadership	<p>4. Relate opportunities within the agriculture industry to the three-circle model.</p> <p><i>Examples: working toward FFA awards and degrees, participating in Career/ Leadership Development Events (CDEs) and Supervised Agriculture Experience (SAEs)</i></p>
Foods and Food Processing	<p>5. Explain criteria for identifying and determining the quality of meat products.</p>

Animal Science

6. Distinguish among unique characteristics of prominent animal breeds.
Examples: beef/dairy, swine, equine animals, goats, sheep, specialty animal breeds
 - a. Identify economically important specialty animals and animal products.
Examples: animals—alligators, cashmere goats, quail, ratites, pheasants, bees; animal products—specialty meats, cheeses, emu oil
7. Compare various types of facilities and structures for domesticated animals.
 - a. Design appropriate handling facilities.
 - b. Demonstrate the proper construction of various types of fencing.
Examples: barbed wire, wooden, electric slick fencing, poultry netting, hog netting/fencing
 - c. Explain the importance of constructing and maintaining farm ponds and farm pond ecosystems.
8. Identify anatomical and physiological characteristics of various livestock, including cattle, swine, sheep, equine animals, and poultry.
9. Compare methods of breeding and reproduction in livestock.
Examples: artificial insemination (AI), embryo transplant; natural selection, cross-breeding, selective breeding
10. Describe the importance of animal biotechnology to humans, including medical, environmental, and production advancements.
*Examples: medical – synthesis of medicines
environmental – animal disease resistance, pest control
production – increased yield, disease-resistant animals*
 - a. Gather and share information about ways scientific research, consumer preferences, and advances in biotechnology influence animal production and development.

	<p>11. Evaluate methods of disease prevention in livestock. <i>Examples: parasite control, vaccination, sanitation</i></p> <p>12. Identify drugs used to treat animal diseases.</p> <p>13. Differentiate animal rights from animal welfare.</p> <ul style="list-style-type: none"> a. Describe responsible ownership of animals. b. List ways the use of animals in research has benefited humans and animals. c. Describe laws governing the use of animals for research. <p>14. Discuss the proper disposal of waste material associated with livestock. <i>Examples: poultry litter, dead birds, composting materials</i></p>
<p>Industrial Agricultural Technologies</p>	<p>15. Identify various types of building materials.</p> <ul style="list-style-type: none"> a. Contrast hardwoods and softwoods including grades and markings. b. Calculate a bill of materials, linear feet, and board feet. c. Compare and contrast the uses of different fasteners and adhesives. <p>16. Differentiate among different building construction systems, including floor systems, wall systems, and ceiling and roofing systems.</p>

Agribiology

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Agribiology uses agricultural contexts to present life science content. As students consider practical agricultural concepts, they apply scientific ways of thinking and working to real-life problems. Content may be enhanced by utilizing appropriate technology.

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Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Agribiology Content Standards

Each content standard completes the stem “*Students will...*”

Organism Structures and Functions

1. Use models to show how cell structures, functions, and processes affect living organisms.
Examples: organelles, proteins, and cellular respiration
2. Develop and use models to explain the composition of DNA as the molecular basis of heredity.
3. Create and employ cell cycle models to explain cell functions related to growth and maintenance of organisms.
Example: Uncontrolled growth results in tumors.
4. Obtain and communicate information on the major animal organ systems to explain how these systems work together to keep animals healthy.
5. Describe and illustrate plant structures and their purposes as they relate to crop production.

Reproduction

6. Differentiate between male and female reproductive structures in plants and animals and discuss their importance.
7. Engage in an argument from evidence to prove that biological and behavioral factors influence reproductive success in organisms.
Examples: pheromones, hormones, coloration, mating rituals

Genetics

8. Explain how agriculturalists manipulate genetics to ensure reproductive success in plants and animals.
9. Obtain, evaluate, and communicate information about advancements in genetic technology and how genetics influence agricultural production.

	<p>10. Obtain, evaluate, and communicate information to explain how agricultural crops and animals are classified by physical characteristics, organized into levels of taxonomy, and identified by binomial nomenclature.</p> <p>11. Examine and interpret data to assess plant and animal adaptations that influence production in agriculture.</p>
<p>Ecosystems</p>	<p>12. Investigate and explain how agricultural crops and animals reflect diversity or lack of diversity in their ecosystems.</p> <p style="padding-left: 40px;">a. Compare and contrast cultivated croplands, pastures, and natural ecosystems to determine biodiversity within each setting.</p> <p>13. Construct an explanation of the interdependence of organisms within ecosystems.</p> <p>14. Analyze and critique changes in ecosystems and their populations caused by agricultural processes.</p>

Agricultural and Biosystems Engineering

Course Credit	1.0
Grade-Level(s)	9-12
Prerequisites(s)	

Agricultural and Biosystems Engineering is an applied course that prepares students for further study or careers in engineering, environmental science, agricultural design and research, and agricultural mechanics. Special emphasis is given to the many applications of geographic information systems (GIS) and global positioning systems (GPS) to achieve various agricultural goals. Upon completion of this course, proficient students will be able to pursue advanced training in agricultural engineering and related fields at a postsecondary institution.

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Foundational Standards

1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.
4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

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| 6. | Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Agricultural and Biosystems Engineering Content Standards

Each content standard completes the stem “*Students will...*”

Occupational Research and Awareness

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| 1. | Gather and analyze authoritative information about employment trends in agricultural engineering and present findings in written or graphic form. |
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Agriculture, Biosystems, and Engineering

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| 2. | <p>Create an evidence-based explanation of ways engineering applications of physics are used to solve issues associated with production agriculture.</p> <p><i>Example: agriculture technology, agriculture facilities, agriculture equipment, engines, circuits, voltage, levers, pulleys, wheel and axles, inclined planes, belts driven systems, precision agriculture</i></p> |
| 3. | <p>Apply the scientific method in deriving engineering solutions for current agriculture issues.</p> <ol style="list-style-type: none"> a. Design a biosystems engineering plan to convert biological materials, including agriculture waste, to useful products. b. Using components of physics, design and assemble a model of a mechanism to aid in harvesting or processing agricultural products. <p><i>Examples: simple machines, crop harvesters, agriculture conveyor systems, animal and plant processors</i></p> |
| 4. | <p>Construct an explanation describing the interactions of the major biological principles used within agriculture, biosystems, and engineering.</p> <p><i>Examples: genetic engineering, GMO, disease diagnosis, nanotechnology, biofuels, biofertilizers, kinetics, biocatalysts, biomechanics, mass and heat transfer</i></p> |

	<p>5. Investigate, analyze, and design an engineering solution to common biological issues affecting production agriculture.</p>
Project Planning and Management	<p>6. Design a project plan for an agricultural engineering project, outlining a strategy for working within a given set of parameters, constraints, and resources.</p> <p><i>Examples: budget, timeline, safety considerations, strategies to minimize adverse environmental impacts</i></p>
Applications of Geographic Information Systems	<p>7. Identify various Geographic Information System and Global Positioning System applications and explain their uses in precision agriculture.</p> <p><i>Examples: precision agriculture management zones, crop water and drought areas, crop imaging, land correlation to crop yields, yield map cleaning and management, drainage analysis and tile mapping, crop data analysis, soil darkness mapping, suitability modeling, and slope angle and accuracy</i></p> <p>8. Use data from geographic information systems to make recommendations for use, management, development, and equipment for a rural plot and an urban plot of land, providing graphic and textual evidence to support each recommendation.</p> <p>9. Analyze, map, and disseminate data from geographic information systems (GIS) and global positioning systems (GPS) portraying a drainage map of a specified region.</p> <ol style="list-style-type: none">Cite specific evidence from findings of mapping systems.Propose changes to drainage and irrigation systems based on data obtained from geographic information systems and global positioning systems.Justify recommendations against accepted soil erosion control practices based on data obtained from geographic information systems and global positioning systems.

Agricultural Structures and Equipment

10. Describe the relationships between concepts of hydrostatics, kinematics, and dynamics of fluid flows as they are applied in agricultural industry irrigation systems.
11. Research agricultural buildings and facilities that meet industry benchmarks for energy efficiency and environmental sustainability.
 - a. Collect observations on the costs and benefits of energy efficient and environmentally sustainable structures and make recommendations to conserve energy and decrease operational cost, developing claim(s) with specific evidence from research.
12. Create a detailed construction plan for an agricultural facility suitable for a designated site, using natural systems and renewable energy where possible.

Examples: plans for conserving energy, material resources, and environmental impact
13. Analyze the physical properties of selected agricultural crops and food products to determine how these properties impact the effectiveness of equipment for harvesting, storage, processing, and transportation.

Examples: density, shape, moisture content, water potential, friction and flow of particulate solids, terminal velocity, thermal properties, and viscoelastic behavior of solids

 - a. Develop a fact sheet detailing the equipment required for appropriate harvesting, storage, processing, and transportation for a variety of crops and products, providing written justification for the choices made.

Agricultural Chemicals

14. Develop safety, storage, and disposal plans for agricultural chemicals.

Examples: pesticides, fertilizers, veterinary medicines

 - a. Outline specific procedures pertaining to responsible selection, storage, mixing, transport, application, and waste disposal of agricultural chemicals, in compliance with applicable regulatory standards.
15. Analyze the chemical and physical properties of selected agricultural fertilizers and chemicals and relate them to specific crops.

	<ul style="list-style-type: none">a. Determine the most efficient and effective method of application for selected agricultural fertilizers and chemicals.b. Demonstrate in a presentation or live setting the ability to calibrate equipment for liquid, solid, and gaseous applications of agricultural fertilizers and chemicals.
Research Project	<p>16. Participate in a team-driven agricultural engineering project approved by the instructor, including research, planning, analysis, construction, testing, and evaluation phases to measure success and adherence to legal constraints.</p> <ul style="list-style-type: none">a. Prepare periodic oral and written reports to exhibit progress on an agricultural engineering project.b. Present an agricultural engineering project including written and visual materials to an appropriate audience.

Agriculture Communications and Technology	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Agriculture Communications and Technology allows students to explore careers in the agricultural communications field, develop effective communication skills, utilize technology in communications, and develop leadership abilities and employment skills for use in agribusiness. Topics include personal communication, media communication, technology, and leadership.

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	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

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Agriculture Communications and Technology Content Standards

Each content standard completes the stem “*Students will...*”

Personal Communication

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| Personal Communication | <ol style="list-style-type: none"> 1. Demonstrate skills which enhance communications. <ol style="list-style-type: none"> a. Develop skills related to proper telephone usage. b. Discuss how non-verbal communication plays a part in interpersonal relationships. 2. Demonstrate individual and group management skills. <ol style="list-style-type: none"> a. Discuss how to communicate in order to resolve conflict and promote team building. 3. Develop skills in public and extemporaneous speaking. 4. Demonstrate the correct use of parliamentary procedures in a meeting. |
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Media Communication

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| Media Communication | <ol style="list-style-type: none"> 5. Develop skills to produce radio and television ads and promotions related to agriculture. 6. Demonstrate techniques and skills required to produce creative works and multimedia presentations related to agriculture for a variety of audiences. <ol style="list-style-type: none"> a. Produce print-quality newspaper and magazine articles, including both news and features. b. Produce brochures and print media advertisements. c. Demonstrate skills for photography and videography used in communications. d. Utilize electronic media to promote agriculture and educate consumers. <p style="text-align: center;"><i>Examples: podcasts, social media</i></p> |
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	<ol style="list-style-type: none">7. Plan, organize, and deliver a sales presentation.8. Obtain and present information on the origins and evolution of agricultural journalism.
Communication Technology	<ol style="list-style-type: none">9. Demonstrate legal and ethical use of technology systems and digital content for an agribusiness.<ol style="list-style-type: none">a. Assess safe and ethical uses of social networking and electronic communication for an agribusiness.10. Utilize the Internet for research, e-mail, and basic communication processes.11. Utilize technology to communicate and maintain records on supervised agricultural experience programs.12. Utilize software used for agribusiness tasks related to business reports, word processing, publishing, presentations, and computer graphics.
Leadership	<ol style="list-style-type: none">13. Describe the importance of leadership in agricultural communication.<ol style="list-style-type: none">a. Differentiate among types of leaders in the agribusiness setting, indicating positive and negative aspects of each leadership style.14. Discuss the reasons for an agricultural communications leader to follow rules and regulations, practice ethical standards, and convey expectations for others to do the same.15. Explain how an effective leader uses time management techniques in the agricultural communication industry. <i>Examples: setting priorities, making schedules</i>

Agricultural Engines	
Course Credit	0.5 (Content standards 1, 2, 3, 4, 5, 8, 9, 14, 15, and 16 must be included.) OR 1.0 (All standards are required.)
Grade Level(s)	9-12
Prerequisite(s)	

Agricultural Engines is designed to prepare students for entry-level employment or advanced training in the agricultural industrial technologies field. Topics include tools, four-stroke engines, two-stroke engines, cooling systems, preventive maintenance, engine overhaul, exhaust systems, and engine repair estimation.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Agricultural Engines Content Standards

Each content standard completes the stem “*Students will...*”

Tools	1. Identify specific tools used on agricultural engines and demonstrate their use.
Four-Stroke Engines	2. Explain how a four-stroke engine operates. 3. Identify parts of a four-stroke engine. <ul style="list-style-type: none"> a. Diagnose mechanical system problems in a four-stroke engine. b. Repair mechanical system problems in a four-stroke engine. 4. Explain how the ignition system works in four-stroke engines. <ul style="list-style-type: none"> a. Diagnose ignition system problems in a four-stroke engine. b. Correct ignition system problems in a four-stroke engine. 5. Explain how the fuel system works in four-stroke engines. <ul style="list-style-type: none"> a. Diagnose fuel system problems in a four-stroke engine. b. Correct fuel system problems in a four-stroke engine. 6. Identify types of fuel and lubricants and indicate the proper uses of each one.

Two-Stroke Engines

7. Explain how a two-stroke engine operates.
8. Identify parts of a two-stroke engine.
 - a. Diagnose mechanical system problems in a two-stroke engine.
 - b. Correct mechanical system problems in a two-stroke engine.
9. Explain how the ignition system works in two-stroke engines.
 - a. Diagnose ignition system problems in a two-stroke engine.
 - b. Correct ignition system problems in a two-stroke engine.
10. Explain how the fuel system works in two-stroke engines.
 - a. Diagnose fuel system problems in a two-stroke engine.
 - b. Correct fuel system problems in a two-stroke engine.
 - c. Identify two-stroke engine fuel and lubricant types and indicate the proper uses of each one.

Cooling Systems

11. Identify components of air and liquid cooling systems in engines and explain their functions.
 - a. Explain the process and need for draining, replacing, and properly disposing of coolants.
 - b. Diagnose and correct cooling system problems in agricultural engines.

**Preventive
Maintenance**

- 12. Demonstrate preventive maintenance procedures for servicing agricultural engines.
- 13. Research and share information about basic types of fuel and lubricants and differentiate their chief components, characteristics, and applications as related to agricultural equipment.

Engine Overhaul

- 14. Demonstrate procedures for disassembling and cleaning agricultural engines.
- 15. Demonstrate procedures for inspecting agricultural engines for wear.
 - a. Demonstrate the procedure for measuring engine components.
- 16. Assemble an agricultural engine according to manufacturer's specifications.

Exhaust Systems

- 17. Explain the operation of an exhaust system on four-stroke and two-stroke engines.

**Engine Repair
Estimation**

- 18. Create a written estimate of repairs including total cost and itemization of parts, labor, and time.
- 19. Create an invoice itemizing work performed and parts used.

Agricultural Industrial Maintenance

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Agricultural Industrial Maintenance prepares students for entry-level employment or advanced training in the agricultural industrial maintenance technologies field. Topics include proper use of power and stationary equipment; interpretation of technical information; basic electricity, construction, plumbing, hydraulics, and pneumatics; basic mechanical theory and application; basic welding theory, setup, and application for metal inert gas (MIG), tungsten inert gas (TIG), and shielded metal arc welding (SMAW); basic oxy-fuel use, setup and application; and basic plasma theory, setup, and application. This course is designed to be taught as a prerequisite for Poultry Industrial Maintenance and Forestry Industrial Maintenance.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
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	<ol style="list-style-type: none">5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Agricultural Industrial Maintenance Content Standards

Each content standard completes the stem “*Students will...*”

Safety	<ol style="list-style-type: none">1. Identify appropriate safety training courses and concepts required for performing maintenance on agricultural industrial equipment and machinery. <i>Examples: OSHA 10-hour course, NCCER safety, MSSC safety tools, lockout/tagout</i>
Portable Power Equipment	<ol style="list-style-type: none">2. Identify specific portable power tools and demonstrate their uses in agricultural industrial maintenance. <i>Examples: power drills, grinders, meters</i>
Stationary Power Equipment	<ol style="list-style-type: none">3. Identify specific stationary power equipment and demonstrate its uses in agricultural industrial maintenance. <i>Examples: Metal Inert Gas (MIG) welding machine, Tungsten Inert Gas (TIG) welding machine, Shielded Metal Arc Welding (SMAW) welding machine</i>

Interpretation of Technical Information	<ol style="list-style-type: none">4. Read and interpret industrial manuals required for maintaining industrial machinery and equipment.5. Apply recommended maintenance techniques for troubleshooting industrial maintenance issues in various types of machinery. <i>Examples: table saws, band saws, MIG welders, lifts</i>
Electricity	<ol style="list-style-type: none">6. Interpret schematics for basic motor control circuits.7. Demonstrate basic concepts and procedures for completing motor control circuits.8. Identify and correct basic problems involving controls, sensors, and relays in electrical equipment.
Mechanical Theory and Application	<ol style="list-style-type: none">9. Discuss and demonstrate the proper techniques for lubricating bearings.10. Discuss the basic theory and application used in various drive systems, including belt, chain, clutch, braking, and gear reduction.
Pneumatic Systems	<ol style="list-style-type: none">11. Explain and apply basic theory used in pneumatics, including pressure, volume, and compressor types.
Hydraulic Systems	<ol style="list-style-type: none">12. Describe the components of hydraulic systems and their functions.13. Discuss the theory and application of hydraulic systems.14. Explain methods for troubleshooting problems in hydraulic systems.

Welding

15. Perform basic MIG and TIG welding techniques in the flat, vertical, horizontal, and overhead weld positions.
16. Demonstrate plasma arc cutting techniques.

Agricultural Welding I	
Course Credit	0.5 (Content standards 1, 2, 3, 4, 8, 9,10, and 11 are required), OR 1.0 (All content standards are required)
Grade Level (s)	9-12
Prerequisite(s)	

Agricultural Welding I provides students with opportunities to become familiar with basic safety and technical information in metal fabrication and to participate in hands-on activities in the laboratory. Topics include tools and equipment, metal preparation, metal cutting, weld quality, and shielded metal arc welding (SMAW).

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Agricultural Welding I Content Standards

Each standard completes the stem “*Students will...*”

Impact of Metal Fabrication	1. Recount the history of metal fabrication and its impact on the construction industry.
Tools, Equipment, and Supplies	2. Explain the proper use of metal fabrication tools and equipment. <i>Examples: tools – cold chisel, file, drill, chipping hammer, grinder, tip cleaner, wire brush, tongs; equipment – welder, welding helmet, fuel valves, oxyfuel torches</i> 3. Differentiate between ferrous and non-ferrous metals used in metal fabrication.
Metal Preparation	4. Demonstrate techniques of cleaning, stripping, grinding, and buffing metal for fabrication.

Metal Cutting

5. Prepare an oxyfuel unit for operation.
 - a. Explain the meaning of each safety color-code for oxyfuel tanks and hoses.
 - b. Explain the purpose of shaded lenses used in oxyfuel welding and cutting.
 - c. Check for cracks and leaks in oxyfuel hoses and regulators.
6. Perform safe welding and cutting operations with an oxy-acetylene torch.
7. Demonstrate procedures for using plasma arc cutting equipment.
 - a. Describe the plasma arc cutting process.
 - b. Identify components of plasma arc cutting equipment.
 - c. Cut metal with a plasma arc cutter.

Weld Quality

8. Analyze weld imperfections to determine corrective measures.
9. Compare destructive and nondestructive weld-testing methods.

**Shielded Metal
Arc Welding
(SMAW)**

10. Explain the Shielded Metal Arc Welding (SMAW) process.

- a. Compare various types of welding electrodes used in Shielded Metal Arc Welding (SMAW).

Examples: E6010, E6013, E7018

11. Demonstrate procedures for adjusting and operating the Shielded Metal Arc Welding (SMAW) machine.

- a. Identify types of welds.

Examples: stringer, overlap, fillet

- b. Identify various types of weld joints.

Examples: butt, lap, corner, T

- c. Contrast methods of striking an arc.

Examples: scratching, tapping, weaving

- d. Demonstrate proper techniques for flat, vertical, horizontal, and overhead welding.

Agricultural Welding II	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	Agricultural Welding I

Agricultural Welding II provides students with opportunities to become familiar with safety, technical information, and fabrication, and to participate in hands-on activities in the lab utilizing the welding processes of Metal Inert Gas (MIG), Tungsten Inert Gas (TIG), and Flux Cored Arc Welding (FCAW). Topics include metal structures; identification and selection of tools, supplies, and equipment; and weld quality.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Agricultural Welding II Content Standards

Each content standard completes the stem “*Students will...*”

Metal Structures	<ol style="list-style-type: none"> 1. Interpret welding symbols used on blueprints. 2. Explain the process of planning and estimating materials needed to complete a metal fabrication project. 3. Explain the importance of preparing metal for welding.
Tools, Supplies, and Equipment	<ol style="list-style-type: none"> 4. Demonstrate uses of tools and equipment in MIG, TIG, and FCAW welding. <i>Examples: tools—cold chisel, file, drill, chipping hammer, metal vise grips, grinder, tip cleaner, wire brush, tongs; equipment—welding helmet, fuel valves, MIG welder, FCAW welder, TIG welder</i> 5. Distinguish among ferrous and non-ferrous metals used in MIG, TIG, and FCAW welding. 6. Identify the various parts of MIG, TIG, and FCAW welding machines and explain the functions of each part. 7. Compare shades of lenses needed in MIG, TIG, and FCAW welding and explain when darker lenses are needed.

**Weld
Applications
and Quality**

8. Examine MIG, TIG, and FCAW welds for imperfections.
 - a. Determine corrective measures to improve welds.
 - b. Explain weld testing methods.
9. Explain how tensile strength, polarity, and rate of travel affect weld quality.
10. Demonstrate the use of MIG, TIG, and FCAW welders.
 - a. Identify typical uses of various types of weld joints.
Examples: butt, lap, corner, T
 - b. Adjust MIG, TIG, and FCAW machine settings for welding.
 - c. Utilize flat, vertical, horizontal, and overhead welding positions.
 - d. Demonstrate stringer, weave, overlap, and fillet welds used in MIG, TIG, and FCAW welding.

**Technology
Applications**

11. Explain the use of technology that enhances metal fabrication and how it improves the quality of the work.
Examples: CNC torch, virtual welding

Agriculture Marketing and Management	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Agriculture Marketing and Management allows students to explore and apply principles, processes, and skills in marketing and management in agribusiness settings. Topics include technologies in marketing, record-keeping, financing, agribusiness, and sales and marketing.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Agriculture Marketing and Management Content Standards

Each content standard completes the stem “*Students will...*”

Technologies in Marketing

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| | <ol style="list-style-type: none"> 1. Demonstrate correct technological, digital, communication, and networking ethics in agricultural marketing. 2. Utilize advanced features of database software, including merging data, sorting, filtering, querying, and creating reports. 3. Utilize technology to promote agricultural products. |
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Record-keeping

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| | <ol style="list-style-type: none"> 4. Maintain records on a supervised agricultural experience program and summarize and analyze results for making financial decisions. 5. Evaluate record-keeping systems and procedures in farming and other agribusiness enterprises, noting advantages and disadvantages of each system. |
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Finances

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| | <ol style="list-style-type: none"> 6. Obtain, evaluate, and share information about economic issues related to agribusiness/farm management. 7. Investigate sources of capital for agriculture, including sources for family farms, farm-related retail businesses, and large corporations. 8. Formulate budgets for both large-scale and small-scale agricultural operations, including income, financial needs, costs, and loan repayments. |
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	<ul style="list-style-type: none">9. Demonstrate procedures for examining inventories to assess values, net worth, efficiency, and production requirements.10. Investigate types of insurance available to agricultural enterprises.
Agribusiness	<ul style="list-style-type: none">11. Identify business practices that are effective in minimizing risk.12. Analyze aspects of effective human resource management within the agricultural industry. <i>Examples: recruitment, retention, training, benefits</i>13. Obtain, evaluate, and share information about government policies related to agriculture, business law, and ethical standards, including conducting business with friends, relatives, or competitors; sales incentives; pricing policies; illegal practices; and relationships with customers, employees, and shareholders.
Sales and Marketing	<ul style="list-style-type: none">14. Demonstrate effective techniques in agricultural sales and marketing.15. Explore marketing options available for agricultural products.<ul style="list-style-type: none">a. Apply concepts of marketing to advertise and promote agricultural products.b. Research marketing programs that promote agricultural products.16. Critique marketing strategies for agriculture products.<ul style="list-style-type: none">a. Construct a marketing plan for agricultural products.

Applied Agriscience	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	Fundamentals of Agriscience

Applied Agriscience provides students with an advanced understanding of Industrial Agricultural Technologies and General Agriculture, two of the five pathways in the Agriculture, Food, and Natural Resources cluster. Students are involved in classroom and laboratory activities in each pathway area. Applied Agriscience emphasizes metal fabrication and power mechanics. Students should be allowed ample time in the laboratory to utilize content in real-world applications.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Applied Agriscience Content Standards

Each content standard completes the stem “*Students will...*”

Impact of Agriculture	<ol style="list-style-type: none"> 1. Explain the impact of agriculture on a selected county’s economy, utilizing National Agricultural Statistics Service (NASS) information. <ol style="list-style-type: none"> a. Compare United States and world agricultural practices and policies.
Technology Applications	<ol style="list-style-type: none"> 2. Employ an electronic record keeping platform to input and record agriculture data. <i>Example: Agricultural Experience Tracker (AET)</i> 3. Demonstrate a variety of technological applications used in the agriculture industry. <i>Examples: Computer Numerical Controlled (CNC), electronic control systems, drones, Global Positioning System (GPS), Geographic Information System (GIS)</i>
Agribusiness Leadership	<ol style="list-style-type: none"> 4. Apply the three-circle model to opportunities within agriscience education. <i>Examples: working toward FFA awards and degrees, participating in Career/Leadership Development Events</i>

Power Equipment Technology

5. Perform routine care and maintenance on engines.
 - a. Demonstrate preventive maintenance procedures used in checking and servicing hydraulic and pneumatic systems.
Examples: changing fluids, changing filters, checking fluid levels, checking hoses
 - b. Describe the purpose of compliance controls on power equipment.
Examples: engine kill switch, inertia brake control
 - c. Demonstrate the procedures for overhauling manual starters and for repairing electric starters.
 - d. Diagnose problems involving power equipment.
Examples: cutting deck – loose belts; chain saw - loose chain; string trimmer – improper fuel mixture; tiller – spark plug

Welding

6. Explain and demonstrate safety techniques for using oxyfuel equipment, including setting up and shutting down, lighting and adjusting a torch, disassembling the equipment, changing cylinders, cutting straight-line and square shapes, and piercing and slot cutting.
7. Demonstrate plasma arc cutting processes.
Examples: identifying, setting up, and storing equipment; cutting
8. Demonstrate techniques for preparing metal for fabrication.
Examples: cleaning base metal, beveling, selecting joint design layout
9. Analyze weld imperfections to determine corrective measures.
 - a. Review codes governing welding.
 - b. Identify weld imperfections and explain causes.
 - c. Compare destructive and nondestructive examination practices.
 - d. Explain the importance of quality workmanship.

	<p>10. Demonstrate the shielded metal arc welding (SMAW) process.</p> <ul style="list-style-type: none"> a. Explain welding electrical current. b. Identify characteristics of welding power supplies. c. Demonstrate how to set up a machine for welding. d. Identify tools used for weld cleaning. <p>11. Compare and contrast various types of welding electrodes used in shielded metal arc welding (SMAW).</p> <ul style="list-style-type: none"> a. Investigate factors that affect electrode selection. b. Select the proper electrode for a welding task. <p>12. Apply techniques for flat, vertical, horizontal, and overhead welding.</p> <ul style="list-style-type: none"> a. Demonstrate the setup of shielded metal arc welding (SMAW) equipment. b. Demonstrate methods of striking an arc. c. Demonstrate stringer, weave, and overlapping welds. d. Perform fillet welds in horizontal, vertical, and overhead positions.
<p>Framing and Finishing</p>	<p>13. Utilize power tools to construct and maintain systems within the agriculture industry.</p> <p><i>Examples: woodworking, plumbing, electrical</i></p> <p>14. Demonstrate finishing techniques in a simulated workplace.</p> <p><i>Examples: prepping, staining, varnishing, painting</i></p>

Aquaculture Science	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

In Aquaculture Science, students are introduced to practical applications of both physical and biological concepts and skills through experiential learning opportunities. While aquaculture is the cornerstone of this course, the program places heavy emphasis on integration of knowledge to solve problems and broaden depth of understanding about water chemistry and management, aquaculture systems, aquatic biology, and health and sanitation.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Aquaculture Science Content Standards

Each content standard completes the stem “*Students will...*”

Importance of Aquaculture Industry

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| | <ol style="list-style-type: none"> 1. Acquire and communicate information regarding the history of aquaculture. 2. Construct an explanation of the role of aquaculture within the field of agriculture, including its history as a traditional means of producing food. 3. Collect and analyze data to summarize the economic significance of aquaculture at the local, state, and national levels. 4. Obtain and communicate information from published materials regarding technological advancements in aquaculture, from simple impoundments to high-technology closed aquatic systems. |
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Aquatic Systems

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| | <ol style="list-style-type: none"> 5. Compare and contrast the distribution of freshwater, brackish water, and saltwater ecosystems, then construct a graphical representation depicting the amounts and percentages found in different reservoirs in the southeastern United States. 6. Gather and synthesize information to explain how biological, geological, and hydrological phenomena impact aquatic systems. |
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<p>Water Chemistry and Quality</p>	<ol style="list-style-type: none"> Plan and carry out investigations to demonstrate methods of monitoring common water quality parameters in the aquaculture industry including temperature, dissolved oxygen, pH, alkalinity, hardness, ammonia, and nitrites. Construct an investigation and create an evidence-based explanation of ways water quality affects fish habitats, health, and performance in aquatic production systems.
<p>Aquaculture Systems</p>	<ol style="list-style-type: none"> Obtain and communicate information to explain the importance of providing correctly-designed aquaculture structures and necessary aquatic equipment. <i>Examples – Structures – fish grow-out tanks, filtration plants, cages and pens, tanks and raceways. Equipment – pumps, aeration devices, seine reels, handling and grading equipment</i> Obtain and communicate information to explain the procedures involved in fish farm production, including selecting suitable farm land or area, fish farm type, cage or pond construction, fish species, feeding, management, harvesting and marketing. Develop and use models of aquaculture systems to produce aquatic crops.
<p>Aquatic Biology</p>	<ol style="list-style-type: none"> Develop and use models to illustrate the structure and explain the function of various body systems of common aquatic animals. Construct and use Punnett square models to calculate the genotype and phenotype for specific characteristics in aquatic animals. Analyze and interpret data to compare adaptations that allow organisms to exist in specific aquatic environments. Use dichotomous keys to classify aquaculture species using binomial nomenclature. Analyze and interpret data to evaluate behavioral and environmental factors that affect growth rates of aquatic organisms, including reproductive habits, feeding habits, interdependence of organisms, overcrowding, and seasonal changes.

	<p>17. Analyze and interpret data to indicate how the fishing industry impacts fish populations, water quality, and aquatic habitats.</p> <p>18. Research and present information regarding government regulation of aquatic production, safe storage and transport of aquatic crops, and marketing strategies.</p>
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Aquatic Biology	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Aquatic Biology explores the aquaculture industry as it relates to biology. Emphasis is placed on scientific concepts involving the use of microscopes and the conversion of unit measurements. Topics include history, aquatic species, water management, health and sanitation, biotechnology, and aquaculture issues.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none">1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; utilizing materials and protective equipment; maintaining a safe work area; and handling hazardous materials and forces.2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Aquatic Biology Content Standards

Each content standard completes the stem “*Students will...*”

History	1. Research and share information on significant achievements and technological advancements in the development of the aquaculture industry.
Aquatic Species	2. Identify and classify aquatic species using scientific nomenclature. 3. Identify exotic, invasive, and indigenous aquatic species and illustrate their distribution throughout North America. 4. Distinguish among types of aquatic animal production in the United States, including facilities and equipment needed for each type. 5. Identify characteristics of ectothermic animals.
Water Quality Management	6. Investigate and explain concepts of diffusion and osmosis as related to aquatic organisms. 7. Formulate procedures necessary for managing water quality within aquaculture environments. <ul style="list-style-type: none"> a. Measure water quality and interpret data. b. Design and build an aquaculture system for monitoring water quality.
Diseases, Predators, and Pests	8. Diagnose major diseases of aquatic environments and identify their causes. 9. Describe measures for managing aquatic predators and pests.

<p>Biotechnology</p>	<p>10. Obtain and share information about contributions of biotechnology to the aquaculture industry, and explain their impact on production, safety, and profits.</p> <p><i>Examples: gene probes for diagnosing viral infections in shrimp, polymerase chain reactions (PCR) for detecting bacterial pathogens in seafood shipments</i></p>
<p>Aquaculture Issues</p>	<p>11. Trace biogeochemical cycles through the environment, including water, carbon, oxygen, phosphorus, and nitrogen.</p> <p style="padding-left: 40px;">a. Describe the effects of natural disasters and environmental changes on the dynamic equilibrium of ecosystems.</p> <p>12. Identify state agencies responsible for the development of effluent limitations, guidelines, and standards for aquatic production and analyze the regulations established by these agencies.</p> <p>13. Identify and discuss causes of potential conflicts concerning land and water use in the aquaculture industry.</p> <p>14. Gather, evaluate, and share information about sustainability problems in aquaculture production.</p>

Career Pathway Project in Agriculture, Food, and Natural Resources

Course Duration	1.0 credit
Grade Level(s)	11-12
Prerequisite(s)	Successful completion of any two courses in the AFNR career cluster

Career Pathway Project (CPP) in Agriculture, Food, and Natural Resources is a capstone course designed for career and technical education students who have completed two or more courses in the AFNR career cluster. This course allows students to utilize their secondary coursework through an experience that showcases their learning. It provides an opportunity for a student to choose an area of interest and engage in an in-depth exploration of the area while demonstrating problem-solving, decision-making, and independent-learning skills. The CPP contributes to an educational plan of challenging courses and practical experiences that prepares students for the workplace or for pursuing further education.

During the CPP, the student works with his or her coordinating teacher, academic teachers, and a product or process mentor who has expertise in the student's field of study. At the conclusion of the CPP, the student presents or demonstrates knowledge gained to an audience consisting of the coordinating teacher, academic teachers, the product or process mentor, peers, and community and business representatives.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

**Foundational
Standards**

1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; utilizing materials and protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.

Career Pathway Project in Agriculture, Food, and Natural Resources Content Standards

Each content standard completes the stem “*Students will...*”

Project Proposal	<ol style="list-style-type: none">1. Create a formal, narrative proposal that communicates a specific concept, process, or product related to a chosen career pathway. <i>Examples: “Effects of Refrigerants on the Ozone Layer,” “Irrigation and Drainage Systems of Sports Fields,” “Remodeling a Bathroom for the Physically Handicapped,” “Marketing a Product for Teenagers,” “Internship for Becoming a Sushi Chef,” “Developing a Disaster Response Plan for a Hospital Emergency Room”</i>
Research	<ol style="list-style-type: none">2. Conduct independent research related to a selected project concept. <i>Examples: Internet research, related readings, original research</i>
Project Report	<ol style="list-style-type: none">3. Write a detailed report on the chosen project, demonstrating correct usage of standard writing format.
Presentation	<ol style="list-style-type: none">4. Produce an original multimedia presentation based upon project results. <i>Examples: producing a digital presentation and oral explanation, creating a documentary, presenting a project model and explanation</i>

Portfolio

5. Design a project portfolio that includes documentation of components of the project and demonstrates the validity of the process.

Examples: components—abstract, table of contents, project proposal, signature sheets, journal entries, research, formal timeline, self-assessment, mentor assessments

Construction Finishing and Interior Systems

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Construction Finishing and Interior Systems is designed to train students in the skills used in the finishing phase of building a structure. Students become familiar with both exterior and interior finishing of a structure. Topics include safety, windows and doors, plumbing, electrical wiring, insulation, wall coverings, interior storage, and finishes.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none">1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Construction Finishing and Interior Systems Content Standards

Each content standard completes the stem “*Students will...*”

Safety	1. Obtain and communicate information about the purpose and use of building codes that regulate construction.
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Windows and Doors	<p>2. Demonstrate the installation of a window in a structure.</p> <ul style="list-style-type: none">a. Identify various types of windows and indicate appropriate uses of each type. <i>Examples: casement, storm, fixed, sliding, double-hung</i> <p>3. Demonstrate the installation of a door in a structure.</p> <ul style="list-style-type: none">a. Identify materials used for door construction and explain advantages and disadvantages of each material. <i>Examples: wood, metal, fiberglass</i>b. Identify types of doors and indicate proper uses for each type. <i>Examples: interior, exterior, bi-fold, swinging, sliding</i>c. Identify types of thresholds used with exterior doors and explain appropriate uses of each type.d. Install door hardware. <i>Examples: hinges, locksets, dead bolt locks</i>
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Plumbing

4. Determine the proper water supply and sewage drainage systems for a structure.
 - a. Identify tools used in plumbing.
Examples: pipe cutter, pipe wrench, torch, tubing cutter
 - b. Select appropriate types of pipe for various plumbing applications and explain the reasons for each selection.
Examples: steel, copper, polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), acrylonitrile butadiene styrene (ABS), Cross-linked PolyEthylene (PEX)
 - c. Explain the selection of proper fittings for joining various kinds of pipe.
 - d. Demonstrate the proper techniques for cutting and joining various types of plumbing pipes.
 - e. Explain the functions of a septic tank system.

Electrical

5. Compare and contrast various components needed for wiring a structure.
Examples: power source, wire, connector, circuit breaker, switch, receptacle
 - a. Identify tools used for electrical wiring and demonstrate their use.
Examples: wire strippers, wire cutters, lineman's pliers, screwdrivers, test meter
 - b. Describe how national and local electrical codes affect the wiring of structures.
 - c. Define terms and symbols in electrical diagrams.
Examples: alternating current (AC), direct current (DC), voltage, amperage, switch, receptacle, light
 - f. Demonstrate techniques for making electrical splices and connections for a single-pole switch with light, a three-way switch with light, and a duplex receptacle, utilizing ground fault circuit interrupters where required by code.

Insulation	<p>6. Obtain and evaluate criteria for selecting insulating materials for structures. <i>Examples: resistance-value (R-value), cost, durability</i></p> <p>7. Describe procedures for installing various insulating materials for structures.</p>
Exterior and Interior Wall Coverings	<p>8. Demonstrate the installation of exterior and interior wall coverings for structures.</p> <ul style="list-style-type: none">a. Differentiate among types of exterior wall coverings for structures, indicating advantages and disadvantages of each type. <i>Examples: wood, vinyl, masonry, metal</i>b. Differentiate among types of interior wall coverings for structures and indicate appropriate uses of each one. <i>Examples: wood, drywall, paneling</i>
Interior Storage	<p>9. Identify and list advantages and disadvantages of various materials, hardware, features, and fasteners used in cabinet construction. <i>Examples: plywood, engineered wood; hidden hinges; slide-out shelves, adjustable shelves</i></p> <p>10. Demonstrate the construction of storage units in structures.</p> <ul style="list-style-type: none">a. Design base and wall-hung storage units.b. Obtain and share information about suitable countertop materials for cabinets in various rooms.c. Install shelving in cabinets and closets.

Finishes

11. Describe various finishes for exterior surfaces and list appropriate uses for each.

12. Apply finishes to interior surfaces.

Examples: paints, lacquers, varnishes, stains, preservatives

a. Prepare interior surfaces for finishing.

b. Identify application methods and tools for finishes and tell when each should be used.

Examples: pneumatic applicators, natural bristle brushes, synthetic bristle brushes

Construction Framing

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Construction Framing provides students with an understanding of the framing phase of building a structure, including framing components, and the skills to complete framing for a structure according to local building codes. Topics include lumber, material estimation, floor systems, wall framing, ceiling framing, stair construction, roof framing, and roof materials.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Construction Framing Content Standards

Each content standard completes the stem “*Students will...*”

<p>Grades and Types of Lumber</p>	<ol style="list-style-type: none"> 1. Select hardwood and softwood lumber to be used in framing agricultural structures. <ol style="list-style-type: none"> a. Describe all factors that determine grades of lumber. <i>Examples: appearance, timber, dimension</i> b. Assess the quality of construction grade lumber used in framing systems to discover defects and determine whether the lumber is suitable for its intended use. <i>Examples: knot, wane, split, check, warp</i>
<p>Estimating Materials</p>	<ol style="list-style-type: none"> 2. Determine material costs for the framing of an agricultural structure.
<p>Floor Systems</p>	<ol style="list-style-type: none"> 3. Determine advantages and disadvantages of multiple types of flooring systems in agricultural structures. 4. Construct a floor framing system for an agricultural structure. <ol style="list-style-type: none"> a. Explain the use of sills used in agricultural structures. b. Demonstrate the layout of joist headers and floor joists used in structures. c. Contrast the composition and applications of various subfloor materials used in structures. <i>Examples: tongue and groove plywood, plywood, oriented strand board</i>

Wall Framing

5. Create a wall framing system for an agricultural structure.
 - a. Compare and contrast wood and metal framing systems, listing advantages and disadvantages of each type.
 - b. Discuss the use of plates in agricultural framing, including sole plates and top plates.
 - c. Compare and contrast the use and installation of various types of studs used in agricultural structures.
 - d. Summarize installation procedures and purposes of rough openings, including headers.
6. Assess a variety of different wall sheathing materials for various uses in agricultural structures.
Examples: foam board, oriented strand board, smart siding, plywood
7. Justify the use of vapor barriers in agricultural framing.
 - a. Critique the effectiveness of different forms of vapor barriers in agricultural wall construction.

Ceiling Framing

8. Design a ceiling framing system for a structure.
 - a. Explain the process of installation of ceiling joists.
 - b. Describe the installation of openings for stairs, attic access, and chimneys.

Stair Construction

9. Identify types of stairs used in structures.
 - a. Calculate the total rise and the numbers and sizes of risers and treads for a stairway.
10. Demonstrate the procedure for laying out and cutting stringers for stair construction.
11. Demonstrate the procedure for installing stair handrails.

Roof Framing

12. Describe different types of roofs used on agricultural structures.

Examples: hip, gable, gambrel, shed

13. Differentiate between conventional rafters and truss systems.

a. Describe the installation of openings for vents, skylights, and chimneys.

b. Design the layout of rafters and truss system in a roof.

14. Discuss the advantages and disadvantages of various decking materials used in agricultural roof systems.

Examples: plywood, oriented strand board

**Roofing
Materials**

15. Compare and contrast various types of materials used for agricultural roof systems.

Examples: asphalt, metal, polycarbonate products

16. Use appropriate methods of securing roofing materials to an agricultural structure.

Examples: nails, staples, clips, adhesives

Construction Site Preparation and Foundations

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Construction Site Preparation and Foundations is designed to train students in procedures involved in the first phases of construction, including planning and site selection. Topics include structure planning, location, layout and foundations, and concrete and masonry.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none">1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Construction Site Preparation and Foundations

Content Standards

Each content standard completes the stem “*Students will...*”

Structure Planning	<ol style="list-style-type: none">1. Demonstrate the mechanical drawing process used in designing agricultural structures.<ol style="list-style-type: none">a. Identify various mechanical drawing components. <i>Examples: dimension, extension, hidden, object, and center lines; symbols</i>2. Research and summarize local building codes affecting the construction of buildings.3. Calculate equipment and workspace requirements for building agricultural structures.4. Identify factors to consider in selecting building materials for agricultural structures. <i>Examples: cost, availability, suitability, durability</i>5. Formulate a bill for materials for a specific agricultural structure.
Structure Location	<ol style="list-style-type: none">6. Identify characteristics which make building sites desirable or undesirable for various types of structures and identify problems which might result from making poor choices. <i>Examples: proper drainage, location, orientation</i>7. Explain the importance of conducting property surveys before beginning construction, including locating property lines, setback lines, and underground utilities.
Structure Layout	<ol style="list-style-type: none">8. Demonstrate building layout procedures for a specific structure. <i>Examples: staking, squaring, leveling, constructing batter boards</i>

**Structure
Foundation**

9. Explain the process of laying out and constructing pier, edge, and footing forms.
10. Describe the use of concrete reinforcements in foundation structures.
Examples: rebar, fiberglass fibers, concrete wire

**Concrete and
Masonry**

11. Demonstrate the proper use of concrete and masonry tools.
12. Demonstrate the process of mixing concrete.
 - a. Estimate the amount of concrete needed for a project.
13. Apply various concrete finishing techniques.
Examples: broom textured finish, smooth finish
14. Design and construct a foundation layout using concrete blocks.

CTE Lab in Agriculture, Food, and Natural Resources

Course Credit	1.0
Grade Level(s)	11-12
Prerequisite(s)	Successful completion of any two courses in the Agriculture, Food, and Natural Resources cluster

CTE Lab in Agriculture, Food, and Natural Resources enhances the student's general understanding and mastery of the Agriculture, Food, and Natural Resources cluster, which contains five pathways—Animal Science, Plant Science, Environmental Science, Industrial Agricultural Technologies, and General Agriculture. This course is designed as a learning laboratory to support students' individual interests and goals. This laboratory may take place in a traditional classroom, in an industry setting, or in a virtual learning environment.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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CTE Lab in Agriculture, Food, and Natural Resources Content Standards

Each content standard completes the stem “*Students will...*”

Occupational Expertise	<ol style="list-style-type: none">1. Demonstrate expertise in a specific occupation within the career cluster.<ol style="list-style-type: none">a. Meet benchmarks selected by the instructor from the appropriate curriculum frameworks, based upon the individual student’s assessed needs.
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Research and Presentation	<ol style="list-style-type: none">2. Conduct investigative research on a selected topic related to the career cluster using approved research methodology, interpret findings, and prepare a presentation to defend results.<ol style="list-style-type: none">a. Select an investigative study referencing prior research and knowledge.b. Collect, organize, and analyze data accurately and precisely.c. Design procedures to test the research.d. Report, display, and defend the results of the investigations to audiences that may include professionals and technical experts.
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	<p>3. Demonstrate higher order critical thinking and reasoning skills appropriate for the selected program of study.</p> <ul style="list-style-type: none">a. Use mathematical and/or scientific skills to solve problems encountered in the chosen occupation.b. Read and interpret information related to the chosen occupation.c. Locate and evaluate key elements of oral and written information.d. Analyze and apply data and/or measurements to solve problems and interpret documents.e. Construct charts, tables, or graphs using functions and data.
Leadership	<p>4. Apply enhanced leadership and professional career skills.</p> <ul style="list-style-type: none">a. Develop and present a professional presentation offering potential solutions to a current issue.b. Practice leadership and career skills through work-based learning, including job placement, job shadowing, entrepreneurship, or internship, or by obtaining an industry-recognized credential of value.c. Participate in leadership development opportunities available through the appropriate student organization and/or other professional organizations.d. Demonstrate written and oral communications skills through presentations, public speaking, live or virtual interviews, and/or an employment portfolio.

Dendrology	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Dendrology is designed to increase students' knowledge of the physiology, ecology, silviculture, scientific nomenclature, taxonomy, identification, and uses of common woody plants of Alabama – trees, shrubs, and woody vines – including native, non-native, threatened, endangered, and invasive species.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Dendrology Content Standards

Each content standard completes the stem “*Students will...*”

Taxonomy

1. Explain the binomial system of naming plants.
2. Identify major forestry species with and without a dichotomous key, based upon distinguishing features.
Examples: leaf shapes, leaf arrangements, long and short pine needle length, flower types
 - a. Create a dichotomous key using available resources in the local area or on the school campus.
3. Describe the differences among trees, shrubs, and vines.

Plant Physiology

4. Explain the functions of the major parts of woody plants, including roots, trunks/stems, branches, and leaves.
5. Describe the type of fruit of major forestry species.

Disease

6. Identify common forest tree pests and diseases and methods of control.
 - a. Investigate and share information about how non-native diseases and pests are introduced into native forests.
 - b. Describe ecological effects and economic impacts of forest pests and diseases.
Examples: Dutch elm disease, hemlock woolly adelgid, southern pine beetle
7. Explain the concept of compartmentalization of decay in woody plants.
Examples: weather pattern effects on rays and rings

<p>Forest Habitats</p>	<p>8. Compare and contrast the various forest habitats.</p> <ul style="list-style-type: none"> a. Describe the basic habitat requirements of woody plants. b. Research and illustrate ranges of forest species in North America. <p>9. Obtain, evaluate, and communicate information about the impact of changing weather patterns on forest habitats and the species of plants and animals within them.</p>
<p>Invasive Forest Plants</p>	<p>10. Classify forest plants as native, non-native, or invasive.</p> <p>11. Describe management and control methods for invasive forest species.</p> <p>12. Investigate the method of dispersal and intended use for intentionally-introduced invasive species.</p> <ul style="list-style-type: none"> a. Describe instances of unintentional introduction of invasive species. b. Investigate efforts to control introduction of non-native species. <p><i>Example: public information campaigns.</i></p>
<p>Endangered Plants</p>	<p>13. List major local and national endangered species of woody plants and give the causes for their endangered status.</p> <ul style="list-style-type: none"> a. Describe habitat needs of endangered species and current efforts to restore their native habitats.

Environmental Management	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Environmental Management provides students with the opportunity to develop an understanding of the principles and practices involved in controlling damage to the natural environment. Topics include ecology, natural resources, water quality, soil science, air quality, waste management, and chemical use and management.

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Foundational Standards	<ol style="list-style-type: none">1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Environmental Management Content Standards

Each content standard completes the stem “*Student will...*”

Ecology

1. Construct an explanation describing the interactions of the major systems or spheres of earth including geosphere, atmosphere, hydrosphere, and biosphere.
2. Use models to illustrate the role of photosynthesis and cellular respiration as carbon cycles through the major spheres of Earth.
3. Use models to trace the flow of water, nitrogen, and phosphorous through Earth’s systems.
4. Obtain, evaluate, and communicate information regarding major biomes, including the organisms that exist within each.
5. Engage in an evidence-based argument to show how biological and physical changes can alter an ecosystem and impact its existing biodiversity and populations.
6. Obtain and evaluate information on regional climate change and predict how such change may affect Earth’s systems and human activity.
7. Engage in an argument to prove that human activity affects biodiversity and can lead to species becoming threatened or endangered.
8. Analyze and interpret agricultural data to determine the impact of agricultural activity on the ecosystems of Alabama.
9. Compare and contrast various animal behaviors including flocking, hunting, migrating, and swarming to determine the effects of each on survival and reproduction rates.
10. Obtain, evaluate, and share information on ways that Earth’s systems, human activities, and other factors positively and/or negatively affect Alabama’s agriculture, environment, and biodiversity.

	11. Use topographic and relief maps to illustrate the biodiversity of regions within the state of Alabama.
Natural Resources	<p>12. Obtain, evaluate, and communicate information describing key natural resources, including water, soil, minerals, and fossil fuels.</p> <p>13. Investigate and analyze the best practices for managing mineral resources, including coal and natural gas.</p> <p>14. Design a solution for conserving and preserving natural water resources against pollutants, including eutrophication, agricultural run-off, and point and nonpoint source pollution.</p> <p>15. Develop and use models to demonstrate the value of renewable and nonrenewable resources and their impact on agriculture and the environment.</p> <p>16. Formulate an evidence-based explanation of how natural and artificial hazards impact water sources and agricultural production.</p> <p><i>Examples: floods, wildfires, drought, earthquakes, hurricanes; pesticide residue</i></p>
Water Quality	<p>17. Plan an investigation to determine the uses of water, including consumption, irrigation, cleaning, heating and cooling, and transporting agricultural products.</p> <p>18. Map freshwater sources and determine their roles in providing water to the local community.</p> <p><i>Examples: wells, reservoirs, aquifers and other underground water accumulations</i></p> <p>19. Analyze and interpret data to determine major residential, industrial, and agricultural water consumers and the effects of their consumption on water resources.</p> <p>20. Test and analyze the quality of freshwater sources and design measures for the protection of natural water resources.</p> <p>21. Compare and contrast coastal waters, marshes, bays, and estuaries to determine their importance as water resources in Alabama.</p>

	22. Obtain and interpret data to be considered in preparing a water management plan.
Soil Science	<p>23. Plan and carry out investigations to determine soil profiles and the composition of soil samples of various soil regions.</p> <p>24. Obtain, evaluate, and communicate information to explain land use practices that promote sustainability.</p>
Air Quality	<p>25. Develop and use models to illustrate the layers of the atmosphere and the composition of air.</p> <p>26. Design a real-world solution to combat the formation of air pollutants.</p> <p>27. Investigate the impact of air quality on plants and animals, human health, and agricultural production.</p>
Waste Management	<p>28. Construct an explanation of ways that managing various types of agricultural waste can impact the environment.</p> <p><i>Examples: poultry litter, human waste, swine waste</i></p> <p>29. Obtain and interpret data to be considered in preparing a waste management plan, including recycling options, disposal of electronic waste products, and landfill management.</p> <p><i>Examples: Data from USDA, Natural Resources Conservation Service, Alabama Cooperative Extension Service</i></p>
Chemical Use and Management	30. Construct an explanation based on evidence to determine the environmental effects of various agricultural pesticides and fertilizers.

Equine Science	
Course Credit	0.5 (Content standards 1, 2, 3, 4, 5, 6, 9, 13, 15, 17, 19, and 22 are required) OR 1.0 (All content standards are required)
Grade Level(s)	9-12
Prerequisite(s)	

Equine Science enables students to become knowledgeable about caring for and managing horses. Topics include safety, history and development, anatomy and physiology, nutrition, health, and selection and conformation. Students also learn about tools, tack, and facilities necessary for the proper care of horses.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Equine Science Content Standards

Each content standard completes the stem “*Student will...*”

Safety

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| | <ol style="list-style-type: none"> 1. Demonstrate techniques for safe handling of equine animals. 2. Discuss the various types of behavior associated with equine animals. |
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History and Development

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| | 3. Describe the history of domestication of horses and the roles horses have played in social and economic development throughout human history. |
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Anatomy and Physiology

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| | <ol style="list-style-type: none"> 4. Collect and share information about the external anatomy of equine animals. 5. Illustrate and describe the internal anatomy and physiology of equine animals. |
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Nutrition

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| | <ol style="list-style-type: none"> 6. Collect information about the nutritional value of equine feed ingredients. <ol style="list-style-type: none"> a. Demonstrate how to balance rations. 7. Identify possible problems associated with feeding equine animals. 8. Explain nutritional requirements at various stages of equine development. |
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Health

9. Collect, evaluate, and share information about common diseases affecting equine animals, preventive measures to avoid them, and disease management practices within the equine industry.
10. Explain preventive measures and treatment methods related to parasites.
11. Describe hoof problems found in equine animals and recognize symptoms of lameness.
 - a. Describe the parts of a horse's hoof and indicate the function of each part.
 - b. Explain the importance of daily foot inspection, including the importance of healthy feet in relation to the overall health of the horse.
 - c. Collect and present information about the farrier's role in the equine industry, including trimming and shoeing.
12. Assess the health status of equine animals.
 - a. Check vital signs and abdominal sounds of equine animals.
 - b. Describe critical and noncritical injuries of equine animals.

**Selection and
Conformation**

13. Identify various breeds, types, and classes of equine animals.
14. Identify common structural problems found in equine animals.
15. Explain factors to be considered in selecting horses for particular uses.
16. Use tooth eruptions and wear to estimate age of equine animals.
17. Describe factors to consider in judging equine halter and performance classes using guidelines from a Career Development Event (CDE).

**Facilities and
Tack**

18. Assess types and features of barns and other equine facilities.
19. Identify tack and equipment used in the equine industry and indicate proper usage of each item using guidelines from a CDE.
Example: Alabama FFA Horse Judging CDE booklet
20. Demonstrate the proper use of tack and equipment for showing, working, and pleasure riding.
21. Collect and share information regarding environmental issues that impact managing and caring for equine animals.

**Horse
Ownership**

22. Tabulate the financial costs associated with horse ownership.
23. Discuss the benefits and responsibilities of horse ownership.

Fish and Wildlife Management	
Course Credit	0.5 (Content standards 1, 2, 3, 4, 5, 8, 12, 13, and 14 are required) OR 1.0 (All content standards are required)
Grade Level(s)	9-12
Prerequisite(s)	

Fish and Wildlife Management is designed to acquaint students with principles and issues involving populations of fish and wildlife in their natural settings. Topics include outdoor safety; fish and wildlife conservation, issues, identification, and ecology; pest and disease management; and outdoor recreation.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Fish and Wildlife Management Content Standards

Each content standard completes the stem “*Students will...*”

Outdoor Safety	<ol style="list-style-type: none"> Describe safety procedures for hunting, boating, and using recreational vehicles. <ol style="list-style-type: none"> Obtain and share information on outdoor survival and first aid techniques. Identify poisonous, venomous, and dangerous animal species in the state of Alabama.
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Fish and Wildlife Conservation	<ol style="list-style-type: none"> Examine the history and importance of fish and wildlife management. <ol style="list-style-type: none"> Describe the economic impact of sport hunting in Alabama. <i>Examples: deer farming, scoring antlers, quail hunting</i> Research and share information about early state and national leaders in fish and wildlife management. Conduct research and present conclusions on conservation organizations to determine their impacts on fish and wildlife populations and their influences on public policy. <i>Examples: Alabama Wildlife Federation, Ducks Unlimited, National Wild Turkey Federation</i> Obtain and share information on state laws that protect fish and wildlife. <i>Examples: bag or catch limits, restrictions on transporting game animals across state lines</i>
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	<p>5. Differentiate among habitat needs of selected species native to Alabama.</p> <ul style="list-style-type: none"> a. Develop a wildlife management plan for a specific area. b. Obtain and share information on methods used to improve and preserve fish and wildlife habitats, citing examples of successful and unsuccessful efforts.
<p>Fish and Wildlife Issues</p>	<p>6. Assess the positive and negative effects of human activities on the environment, fish species, and wildlife species.</p> <p><i>Examples: positive - planting sea grass, conserving habitats; negative – polluting water or air</i></p> <ul style="list-style-type: none"> a. Explain environmental effects of introducing non-native and invasive species into an area. <p><i>Examples: cogon grass, kudzu, silver carp, exotic pets</i></p> <ul style="list-style-type: none"> b. Describe ways wildlife may cause economic damage to personal property and obtain and share information regarding the cost of such damage. c. Identify technologies used in monitoring endangered species. <p><i>Examples: mapping, locating animal migration</i></p> <ul style="list-style-type: none"> d. Identify economic and environmental issues surrounding endangered and threatened species of fish and wildlife. <p><i>Example: recovery strategies</i></p>
<p>Fish and Wildlife Identification</p>	<p>7. Distinguish between game and nongame wildlife species.</p> <ul style="list-style-type: none"> a. Classify wildlife species, including mammals, birds, reptiles, amphibians, and fish. <p>8. Identify common fish and wildlife species indigenous to Alabama.</p>

<p>Fish and Wildlife Ecology</p>	<p>9. Compare and contrast aquatic and terrestrial ecosystems. <i>Examples: wetlands, woodlands, grasslands</i></p> <p>10. Identify environmental hazards affecting ecosystems in Alabama. <i>Examples: fertilizer runoff, industrial discharge into waterways, overfishing, draining marshes</i></p>
<p>Disease and Pest Management</p>	<p>11. Identify pests and diseases affecting fish and wildlife species. <i>Examples: Chronic Wasting Disease in deer, Ick on fish, ticks, mites</i></p> <ul style="list-style-type: none"> a. Describe methods of transmission of pests and diseases in fish and wildlife. b. Describe preventive measures and treatment methods for pests and diseases affecting fish and wildlife.
<p>Outdoor Recreation</p>	<p>12. Identify outdoor recreational opportunities in Alabama.</p> <ul style="list-style-type: none"> a. Examine methods of developing and managing outdoor recreational enterprises in ways that are not harmful to fish and wildlife populations. <p>13. Research and share information about fish populations in major waterways in Alabama and how they are impacted by shipping, water sports, and industrial water use.</p> <p>14. Engage in a research-based argument about balancing society's need for access to nature and recreational opportunities with the need to preserve wild areas and the species that live there.</p>

Floriculture and Floral Design	
Course Credit	0.5 (Content standards 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 13, 15, 18, and 22 are required) OR 1.0 (All content standards are required)
Grade Level(s)	9-12
Prerequisite(s)	

Floriculture and Floral Design prepares students to work in or operate a retail floral design business and introduces students to the basics of growing flowers for retail sale. Topics include history, floral structures, floral propagation, floral growth requirements and identification, pest management, handling procedures, elements of design, design mechanics, and business operations.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Floriculture and Floral Design Content Standards

Each content standard completes the stem “*Student will...*”

History	1. Discuss the history of floriculture and floral design, including the role of flowers in past civilizations.
Floral Structures	2. Compare and contrast the structures of monocot and dicot plants. 3. Differentiate between complete and incomplete flowers produced by flowering plants. 4. Illustrate various parts of the flower and discuss the importance of each.
Floral Propagation	5. Demonstrate propagation of common flowering and foliage plants through sexual and asexual means.

<p>Floral Growth Requirements</p>	<p>6. Assess environmental and cultural factors that affect growth of plants in the floriculture industry.</p> <ul style="list-style-type: none"> a. Describe the roles sunlight, water, pH, and carbon dioxide play in flower growth and development. b. Assess different types of growing media used in the floriculture industry. c. Identify various plant nutrients that specifically affect flower growth and development. <p>7. Compare and contrast different growing environments and indicate how each setting affects floral growth.</p> <p><i>Examples: greenhouse, high tunnel, field</i></p>
<p>Floral Identification</p>	<p>8. Identify various species of flowering and foliage plants and describe how they are commonly used in the floriculture industry.</p> <ul style="list-style-type: none"> a. Differentiate between annual and perennial flowering and foliage plants.
<p>Pest Management</p>	<p>9. Identify common pests that affect the floriculture industry.</p> <ul style="list-style-type: none"> a. Compare and contrast a variety of methods to control insects and diseases in flowers, noting the advantages, disadvantages, and environmental effects of each method.
<p>Handling Procedures</p>	<p>10. Demonstrate techniques for conditioning and maintaining flowers and other floral design materials.</p> <p><i>Examples: preservatives, refrigeration; deadheading</i></p> <p>11. Identify tools employed in the floriculture industry and demonstrate their proper use.</p>

<p>Elements of Design</p>	<p>12. Discuss the principles of balance, proportion and scale, focal point, emphasis, rhythm, harmony, and unity in creating a design.</p> <p>13. Describe the incorporation of the design elements of line, form, and texture within a floral design.</p> <p>a. Use the color wheel to create color schemes in floral designs.</p>
<p>Design Mechanics</p>	<p>14. Identify and create various forms of floral products.</p> <p><i>Examples: boutonnieres, corsages, wreaths, potted plants; circular and triangular forms</i></p> <p>15. Compare and contrast various floral construction techniques and materials.</p> <p><i>Examples: wiring and taping, use of bows, floral foam, and adhesives.</i></p> <p>16. Design and create floral arrangements using proper techniques to illustrate each design principle.</p>
<p>Business Operations</p>	<p>17. Compare and contrast retail and wholesale floral practices.</p> <p>18. Explain pricing criteria used in the floral industry.</p> <p>19. Prepare plants and merchandise for marketing.</p> <p>20. Demonstrate different types of sales transactions.</p> <p><i>Examples: computer/cash register, charge card, telephone order, floor sales, e-commerce</i></p> <p>21. Research and share information regarding domestic and foreign sources of commonly-used flowers and plants.</p> <p>22. Gather and communicate information about managerial skills required for operating a successful floral business.</p> <p><i>Examples: scheduling, handling customer complaints, keeping records, inventorying, ordering, invoicing, budgeting, advertising, relating to employees, partnering, communicating orally and in writing.</i></p>

Food Safety and Microbiology

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Food Safety and Microbiology is a specialized area of study focusing on pathogens and spoilage microorganisms in foods, the conditions under which they grow, and conditions under which they are commonly inactivated, killed, or made harmless; principles involved in food fermentation; the role of food in immunology; effective sanitation practices to control pathogen and microbial growth in food; principles involved in food preservation; grade classifications of meat and produce; and microbial analysis to determine food quality.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Food Safety and Microbiology Content Standards

Each content standard completes the stem “*Students will...*”

Introduction to Microbes in Food	<ol style="list-style-type: none"> 1. Compare and contrast early developments in food microbiology to current practices. 2. Obtain, evaluate, and communicate information about the positive and negative effects of microorganisms on food products and their implications for the food processing industry. 3. Formulate evidence-based solutions to American and global food safety concerns.
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Food Virology and Microbial Spoilage of Foods	<ol style="list-style-type: none"> 4. Obtain, evaluate, and communicate information to explain how bacteria, yeasts, and molds are classified, using taxonomic classification and scientific nomenclature. 5. Using basic concepts of food virology, engage in an argument to justify the grouping of viruses in a category separate from living things. 6. Use models to compare and contrast the structures of microorganisms in foods. 7. Identify types of viruses, bacteria, yeasts, and molds in food processing; compare and contrast their characteristics and behavior in a variety of food products. <i>Examples: microbial spoilage of meat, eggs, milk, seafood, vegetables, fruits, and grains and products made from them</i> 8. Identify specific microorganisms which may cause food spoilage during preparation, processing, and storage. 9. Formulate an evidence-based explanation of methods to control food- and water-borne microorganisms in high risk foods.
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	<ul style="list-style-type: none">10. Obtain, evaluate, and communicate information about how a host responds to food-borne viral and microbial infections.11. Classify foods based on their perishability and risk level to public health, considering their acidity and water activity.12. Use computer and mathematical modeling to estimate microbial growth in food products.
Food Fermentation	<ul style="list-style-type: none">13. Use principles of fermentation to create fermented food products.14. Identify and analyze microorganisms in fermented foods.
Food Immunology	<ul style="list-style-type: none">15. Formulate an explanation of the immunology of food-related allergies, intolerances, and hypersensitivities.16. Identify and communicate the role of foods in regulating host immune response, cancer immunology, and immunodeficiency diseases.
Control of Microorganisms in Foods	<ul style="list-style-type: none">17. Select and use appropriate methods of sanitation, heat treatment, irradiation, modified atmosphere, antimicrobial preservative, and combinations of methods (hurdle concept) to control microbial growth in food products, explaining the principles underlying each method.18. Develop and use a Hazard Analysis and Critical Control Point (HACCP) plan.
Food Grading	<ul style="list-style-type: none">19. Grade meat and produce according to guidelines published by the United States Department of Agriculture (USDA).

**Microbiological
Analysis**

- 20. Apply the principles of sampling and sample preparation in microbiological analysis.
- 21. Assess microbial activity in foods by qualitative and quantitative microbiological analyses.

Forestry	
Course Credit	0.5 (Content standards 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 22 are required) OR 1.0 (All content standards are required)
Grade Level(s)	9-12
Prerequisite(s)	

Forestry is designed to inform students about forestry management, woodlands conservation, and wood technology. Topics include safety, history, dendrology, silviculture practices, protection of forests, forestry equipment, forest products and marketing, tree measurement, and mapping.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Forestry Content Standards

Each content standard completes the stem “*Students will...*”

Safety

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| | 1. Identify potential hazards to individuals working in Alabama forests.
<i>Examples: topographic hazards, venomous snakes, stinging insects, poisonous plants</i>
a. Describe methods of avoiding potential hazards in Alabama forests. |
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History

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| | 2. Describe historical events that have influenced forestry in Alabama and the United States. |
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Dendrology

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| | 3. Describe the parts of a tree and their functions.
4. Identify common tree species of Alabama by their common and scientific names.
a. Compare and contrast characteristics of hardwood and softwood trees, and gymnosperms and angiosperms. |
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Silviculture Practices

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| | 5. Compare and contrast artificial and natural reforestation methods.
a. Identify sources of tree seedlings.
b. Describe proper methods for the handling and care of seedlings.
c. Compare methods of hand and mechanical planting of seedlings, discussing the advantages and disadvantages of each method. |
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	<ol style="list-style-type: none"> 6. Obtain and share information on the importance of prescribed burning. 7. Compare and contrast habitats of major forest species in Alabama. 8. Explain the various management objectives of forest landowners. <p><i>Examples: timber, wildlife, recreation, aesthetics</i></p> <ol style="list-style-type: none"> 9. Identify factors that should be considered before establishing a forest. 10. Compare methods of harvesting timber, including clear, selection, shelterwood, and seed tree cutting.
Protection of Forests	<ol style="list-style-type: none"> 11. Describe types of forest fires and explain the methods of controlling them. <ol style="list-style-type: none"> a. Describe the concepts and methods involved in scheduling and conducting controlled burns. 12. Identify the major insects and diseases that damage forest trees in Alabama and explain methods of controlling them. 13. Identify undesirable and invasive plant species and explain methods of controlling them. 14. Research and share information about conservation easements, land trusts, and other means of preserving forests and other wild areas.
Forestry Equipment	<ol style="list-style-type: none"> 15. Identify types of tree-harvesting equipment and explain their uses. 16. Demonstrate the use of forestry hand tools, including pruning saws, bow saws, loppers, and brush cutters. 17. Demonstrate procedures for adjusting, operating, and maintaining a chain saw.

<p>Forest Products and Marketing</p>	<p>18. Describe chemical and physical properties of wood.</p> <p>19. Identify primary and secondary products produced from wood. <i>Examples: primary - lumber, timber; secondary - paper, pine straw</i></p> <p>20. Analyze characteristics of lumber to determine grade.</p> <p>21. Describe wood treatment processes and discuss environmental issues involved in their use.</p>
<p>Tree Measurement</p>	<p>22. Demonstrate the use of tree measurement tools.</p> <ul style="list-style-type: none"> a. Describe techniques for measuring tree diameter at breast height (DBH.) b. Describe techniques for measuring total tree height. c. Describe techniques for measuring pulpwood at marketable height. d. Describe techniques for measuring saw logs.
<p>Mapping</p>	<p>23. Interpret map characteristics and features.</p> <ul style="list-style-type: none"> a. Demonstrate the use of mapping tools, including direction, elevation, and distance-reading tools. <p>24. Compare and contrast the types and functions of precision and advanced technologies that are used in mapping of the forest. <i>Examples: GIS, GPS, drones</i></p>

Forestry Industrial Maintenance	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	Agricultural Industrial Maintenance

Forestry Industrial Maintenance is designed to prepare students for entry-level employment or advanced training in the forestry industrial maintenance field. Topics include hand tool safety, use of power equipment, interpreting technical information, basic electricity, basic pneumatics, basic hydraulics, basic welding theory and setup for MIG, TIG, and SMAW, basic oxyfuel use and setup, and basic plasma arc theory and setup.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Forestry Industrial Maintenance Content Standards

Each content standard completes the stem “*Students will...*”

Safety	<p>1. Complete safety courses required in forestry industry maintenance and demonstrate safety concepts required for performing maintenance on forestry industrial equipment and machinery, including safe use of tools, lockout/tagout procedures, and general safety.</p> <p><i>Examples: OSHA 10-hour course, NCCER safety, MSSC safety</i></p>
Basic Industrial Math	<p>2. Apply basic math concepts to the forestry industry.</p> <p><i>Examples: reading and interpreting schematic drawings, converting units of measurement, calculating tolerances and percentages</i></p>
Interpreting Technical Information	<p>3. Read and explain manuals detailing maintenance procedures for machinery and equipment used in the forestry industry.</p> <p>4. Interpret instructions for resolving forestry maintenance issues.</p> <p>5. Apply recommended techniques for trouble-shooting maintenance problems with forestry equipment and machinery.</p>
Tools	<p>6. Demonstrate proper use of hand tools used in forestry industrial maintenance.</p> <p><i>Examples: screwdrivers, hammers, wrenches</i></p>

Portable Power Equipment	<p>7. Demonstrate the use of specific portable power tools used in forestry industrial maintenance.</p> <p><i>Examples: power drills, grinders, meters, welders</i></p>
Mechanical Theory and Application	<p>8. Discuss the proper technique for lubrication of bearings in machinery and equipment used in the forestry industry.</p> <p>9. Differentiate between the basic theories and applications used in the various drive systems of forestry equipment, including belt and chain drive, clutch drive, braking, and gear reduction.</p> <p>10. Troubleshoot the logics of a programmable logic controller (PLC).</p> <p>11. Use appropriate instruments to measure flow, pressure, temperature, and motion, and record results.</p>
Electricity	<p>12. Discuss electrical theory including Ohm's Law, AC, and DC.</p> <p>13. Interpret basic motor control circuit schematics for machinery and equipment used in the forestry industry.</p> <p>14. Explain procedures for troubleshooting motor control circuits.</p> <p>15. Troubleshoot basic issues involving controls, sensors, and relays in machinery and equipment used in the forestry industry, and discuss ways to handle problems in manufacturing facilities and in the field.</p>
Pneumatic Systems	<p>16. Apply basic theories and methods to troubleshoot pneumatic systems used in forestry machinery.</p> <p><i>Examples: pressure, volume, and compressor types</i></p>

Hydraulic Systems

17. Identify the components of hydraulic systems in machinery used in the forestry industry.
18. Discuss the theory and application of hydraulic systems.
19. Discuss ways to troubleshoot issues in hydraulic systems.

Welding

20. Demonstrate basic MIG welding techniques.
Examples: flat, vertical, horizontal, and overhead welds
21. Demonstrate basic TIG welding techniques.
Example: flat, vertical, horizontal and overhead welds
22. Demonstrate basic plasma arc welding techniques.

Fundamentals of Agriscience	
Course Credit	0.5 (Content standards 1, 3, 5, 8, 10, 13, 14, 16, 17, and 18 are required) OR 1.0 (All content standards are required)
Grade Level(s)	9-12
Prerequisite(s)	

Fundamentals of Agriscience is an introductory course that provides students with a general overview of Animal Science, Plant Science, Environmental Science, Industrial Agricultural Technologies, and General Agriculture, the five pathways within the Agriculture, Food, and Natural Resources cluster. Students are involved in classroom and/or laboratory activities in each of the five pathway areas. Emphases of Fundamentals of Agriscience include introduction to agriculture, technology, The National FFA, leadership, forestry, soils, wildlife, plants, aquaculture, animals, woodworking, welding, small engines, electricity, and plumbing.

It is strongly recommended that Fundamentals of Agriscience be a prerequisite for all other Grades 9-12 courses in the cluster.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none">1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
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	<ol style="list-style-type: none"> 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Fundamentals of Agriscience Content Standards

Each content standard completes the stem “*Students will...*”

Impact of Agriculture	<ol style="list-style-type: none"> 1. Define <i>agriculture</i> and identify major divisions of the agriculture industry. <ol style="list-style-type: none"> a. Identify major agricultural commodities in the local area, state, nation, and world. b. Describe various agricultural organizations and their roles in the agricultural industry. 2. Create a timeline listing major changes and accomplishments in the history of agriculture.
Technology Applications	<ol style="list-style-type: none"> 3. Utilize technology to access, manage, and integrate agricultural information. <i>Examples: spreadsheets, databases, web-based drives, electronic record keeping, Geographic Integration System, Global Positioning System, drones</i> <ol style="list-style-type: none"> a. Identify technological advances that enhance the agriculture industry.
Agribusiness Leadership	<ol style="list-style-type: none"> 4. Apply problem-solving and decision-making skills to address agribusiness issues. <i>Examples: supply and demand, financial management, marketing</i> 5. Discuss the history and structure of agriscience education and its three-circle model. <ol style="list-style-type: none"> a. Examine the history of the National FFA Organization. b. List legislation which mandates or supports agricultural education.

	<ol style="list-style-type: none"> 6. Identify components of a Supervised Agricultural Experience (SAE), including manageability, record keeping, availability of facilities, financing, and award opportunities. <i>Examples: award opportunities - agriscience fairs, proficiency awards, degree applications, scholarships</i> <ol style="list-style-type: none"> a. Identify financial considerations as factors to be considered in agricultural opportunities and selecting a Supervised Agricultural Experience (SAE). 7. Demonstrate communication skills through Leadership Development Events (LDEs), including prepared public speaking, extemporaneous speaking, creed speaking, conduct of a chapter meeting, and parliamentary procedure. <ol style="list-style-type: none"> a. Practice listening and speaking skills. b. Refine reading and writing skills.
<p>Environmental Science</p>	<ol style="list-style-type: none"> 8. Identify methods and practices for conserving the environment. <ol style="list-style-type: none"> a. Explain the importance of natural resources. 9. Identify major soil areas in Alabama. <ol style="list-style-type: none"> a. Identify layers of soil in a soil profile. b. Determine the texture of various soil samples. c. Determine the land capability class for a given plot of land. d. Explain how to adjust soil pH. 10. Discuss forest management practices. <ol style="list-style-type: none"> a. Identify trees for local, state, national, and global markets. b. Identify potential hazards for Alabama forests and forest professionals. <i>Examples: invasive species; venomous spiders and snakes, poisonous plants, topographic hazards</i>

	<p>11. Discuss ethical and legal responsibilities involved in wildlife management.</p> <ul style="list-style-type: none"> a. Describe state hunting laws and regulations concerning wildlife. b. Explain hunting safety practices. <p>12. Identify common fish and wildlife species of Alabama.</p>
<p>Plant Science</p>	<p>13. Identify characteristics and functions of plants.</p> <ul style="list-style-type: none"> a. Explain plant processes, including photosynthesis, respiration, and transpiration. b. Identify the essential elements needed for plant health and growth. c. Identify various necessities for producing plants. d. Demonstrate sexual and asexual plant propagation. e. Discuss the use of chemicals in agriculture. <p><i>Examples: herbicides, fungicides, insecticides</i></p>
<p>Animal Science</p>	<p>14. Identify characteristics of common breeds of livestock including cattle, swine, sheep, equine animals, and poultry.</p> <ul style="list-style-type: none"> a. Identify species-specific terminology used to identify livestock. <p><i>Example: bovine- bull, cow, heifer, steer, calf</i></p> <ul style="list-style-type: none"> b. Explain practices used to manage livestock, including handling, breeding, vaccinating, and transporting. c. Determine nutritional requirements for livestock, including cattle, swine, sheep, equine animals, and poultry. <p>15. Differentiate among types of aquaculture enterprises in Alabama, including catfish, crawfish, shrimp, and tilapia.</p>

**Industrial
Agricultural
Technology**

16. Apply mathematical, reading, and writing skills used in woodworking.
 - a. Demonstrate procedures for constructing a woodworking project, including completing a bill of materials, calculating board feet, selecting tools, applying measurements, cutting, assembling, and finishing.
17. Examine procedures used in welding.
18. Explain the theory of operation for two- and four-stroke small engines.
19. Identify major components and functions of basic wiring circuits.
20. Identify procedures for installing and maintaining plumbing lines and fixtures for structures.

Greenhouse and Nursery Production

Course Credit	0.5 (Content standards 1, 2, 3, 4, 5, 7, 9, 13, and 15 are required) OR 1.0 (All content standards are required)
Grade Level(s)	9-12
Prerequisite(s)	

Greenhouse and Nursery Production gives students the opportunity to utilize, manage, and maintain facilities and tools and to carry out procedures used in growing plants commercially. The course prepares them to own, manage, or work in greenhouses and plant nurseries. Topics include facilities, growing media, propagation, plant identification, production, pest and disease management, and business management.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Greenhouse and Nursery Production Content Standards

Each content standard completes the stem “*Students will...*”

Facilities

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| | <ol style="list-style-type: none">1. Describe characteristics of greenhouses and create a list of factors to be considered when planning and designing greenhouse facilities, including physical location, market potential, utilities, climatic conditions, and production goals.
<i>Examples: frames, glazing materials, coverings, shade cloth.</i>2. Maintain, operate, and repair greenhouse and nursery facilities and equipment. |
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Growing Media

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| | <ol style="list-style-type: none">3. Determine types of soil and growing media to support optimum growth of a variety of landscape and ornamental plants.<ol style="list-style-type: none">a. Collect and analyze soil samples.4. Formulate appropriate soils and growing media for greenhouse and nursery crops.<ol style="list-style-type: none">a. Adjust soil pH and nutrient levels.5. Compare uses, methods of application, advantages, and disadvantages of chemical and organic fertilizers. |
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Propagation

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| | <ol style="list-style-type: none">6. Demonstrate sexual and asexual propagation techniques in greenhouse and nursery crops. |
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Plant Identification	7. Apply concepts of scientific taxonomy and industry-specific terminology in identifying greenhouse and nursery crops.
Production	8. Identify and control environmental factors for optimal greenhouse and nursery plant growth. <i>Examples: temperature, ventilation, irrigation, light, pest management</i> 9. Produce annual and perennial greenhouse and nursery crops.
Pest and Disease Management	10. Describe common greenhouse and nursery diseases, pests, and environmental problems and assess their effects on profits. 11. Select appropriate pest control methods based on Integrated Pest Management (IPM) strategies. a. Develop a pest management plan for a commercial nursery. 12. Locate and explain information on pesticide labels, including target pests and crops, application rates, and requirements for PPE and safe handling.
Business Management	13. Produce or purchase quality greenhouse and nursery plants for market. 14. Create a marketing plan for a selected greenhouse or nursery crop. 15. Demonstrate customer service and managerial skills for successfully operating a plant sale.

Horticulture Science	
Course Credit	0.5 (Content standards 1, 2, 3, 4, 5, 7, 9, 13, and 15 are required) OR 1.0 (All content standards are required)
Grade Level(s)	9-12
Prerequisites(s)	

Horticulture Science introduces students to plants, facilities, tools, and techniques used in the horticulture industry. Topics include plant physiology and propagation, growth requirements, facilities, horticulture crop production, pest management, and technological applications.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Horticulture Science Content Standards

Each content standard completes the stem “*Students will...*”

Plant Physiology

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| Plant Physiology | <ol style="list-style-type: none"> 1. Compare different structures of annuals, biennials, and perennials and discuss their purposes. <ol style="list-style-type: none"> a. Identify sexual plant parts, including flower, seed, and fruit. b. Identify asexual plant parts, including stem, leaf, and root. |
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Plant Propagation

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| Plant Propagation | <ol style="list-style-type: none"> 2. Create new plants through sexual and asexual propagation methods. 3. Describe the purpose and use of growth regulators.
<i>Examples: rooting stimulants, retardants</i> 4. Investigate the roles of DNA, heritability, and genetic applications in plant breeding. |
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Growth Requirements

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| Growth Requirements | <ol style="list-style-type: none"> 5. Compare and contrast the components of soil.
<i>Examples: sand, silt, clay, organic matter</i> <ol style="list-style-type: none"> a. Analyze soil samples to determine what nutrients should be added for optimal foliage and flower production. 6. Investigate and debate the pros and cons of soil and soilless media.
<i>Examples: peat, perlite, vermiculite, hydrogel</i> |
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	<p>7. Describe the functions of various nutrients needed for plant growth.</p> <p><i>Examples: macronutrients (N, P, K), secondary nutrients, and micronutrients</i></p>
Facilities	<p>8. Compare and contrast various designs for greenhouses and nursery facilities, noting the advantages and disadvantages of each design.</p> <p>a. Describe the structures and functions of basic greenhouse components.</p> <p><i>Examples: coverings, tables, irrigation and temperature control</i></p> <p>b. Design a basic nursery production facility, incorporating various structures and components.</p> <p><i>Examples: shade house, ground cover, irrigation systems</i></p> <p>9. Compare and contrast facilities and applications of hydroponics and aquaponics, noting the advantages and disadvantages of each.</p>
Horticulture Crop Production	<p>10. Describe growing methods for greenhouse and nursery crops, including fruits, vegetables, and ornamentals.</p> <p>11. Identify common horticulture plants.</p> <p>a. Explain plant taxonomy and the use of binomial nomenclature.</p>
Pest Management	<p>12. Gather, evaluate, and share information identifying horticulture pests and methods of controlling them.</p> <p>a. Classify common types of pests.</p> <p>13. Describe Integrated Pest Management (IPM).</p>

**Technology
Applications**

14. Utilize various technologies in the horticulture industry.

Intermediate Agriscience

Course Credit	1.0
Grade Level(s)	9-12
Prerequisites(s)	

Intermediate Agriscience builds on basic understanding of the Plant Science, Environmental Science, Industrial Agricultural Technologies, and General Agriculture pathways within the Agriculture, Food, and Natural Resources cluster. Students are involved in classroom and laboratory activities in each area. Intermediate Agriscience emphasizes plant systems, environmental systems, and industrial agricultural technologies.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Intermediate Agriscience Content Standards

Each content standard completes the stem “*Students will...*”

Impact of Agriculture

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| | <ol style="list-style-type: none"> 1. Describe the impact of various agricultural commodities on Alabama’s economy. <ol style="list-style-type: none"> a. Discuss the effects of state and national legislation as it relates to contemporary issues in the agriculture industry. b. Describe Alabama’s agricultural imports and exports. 2. Collect and input data utilizing electronic record keeping systems.
<i>Example: Agriculture Experience Tracker (AET)</i> 3. Apply advancements in agriculture technology as they relate to industry standards.
<i>Examples: electronic control systems, drones, Global Positioning Systems (GPS), Geographic Information System (GIS), satellite imaging systems</i> |
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Agribusiness Leadership

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| | <ol style="list-style-type: none"> 4. Describe the three-circle model as used in agriscience education.
<i>Examples: working toward FFA awards and degrees, participating in Career/ Leadership Development Events (CDE/LDE)</i> |
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**Natural
Resources
and
Environmental
Management**

5. Identify potential hazards to Alabama wildlife, forests, and forest professionals.
Examples: topographic challenges, unsafe hunting practices
6. Explain basic forest management practices.
 - a. Identify common trees of Alabama.
 - b. Demonstrate common forestry tools and calculations.
Examples: Biltmore stick, clinometer, diameter tape, board feet, compass, mapping, timber cruising, saw timber volume
 - c. Discuss timber stand improvement and best management practices in forestry.
7. Explain basic concepts of agronomy.
 - a. Evaluate soil texture.
 - b. Determine slope of land.
 - c. Analyze land capability classes.

Plant Systems

8. Classify plants based on life cycles and uses in agriculture.
Examples: annuals, biennials, perennials; cool and warm season vegetables, ornamentals
9. Explain methods of sexual and asexual plant reproduction.
Examples: seeds, pollination; cuttings
10. Describe macronutrients and micronutrients needed for plant growth.
11. Explore various settings for production of agricultural crops.
Examples: greenhouse, garden, outdoor learning lab
12. Identify plants by common names and give descriptions of common agricultural crops in Alabama.

**Industrial
Agricultural
Technologies**

13. Utilize power equipment in order to manipulate materials.

Example: Use a circular saw, drill, or welder to construct a project.

14. Perform routine care and maintenance on small engines.

Examples: replace spark plugs, air filter, oil, and oil filter

15. Demonstrate procedures used in wiring electrical circuits.

Examples: use a voltage meter, install wiring, draw a circuit

16. Demonstrate plumbing installation and maintenance.

Examples: install irrigation lines, sweat copper, repair valves

Introduction to Agricultural Construction

Course Credit	1.0
Grade Level(s)	9-12
Prerequisites(s)	

Introduction to Agricultural Construction provides students with an overview of framing and building a structure. Topics include lumber, metal, material estimation, floor systems, framing systems (ceiling, wall, roof), and roofing materials for various structures.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. Foundational standards are to be incorporated throughout the course

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Introduction to Agricultural Construction Content Standards

Each content standard completes the stem “*Students will...*”

Types and Styles of Buildings	1. Compare applications of types and styles of materials that can be used in agricultural structures. <i>Examples: metal (beams, siding, and roofing), wood (beams, timbers)</i>
Grades and Types of Lumber	2. Compare the use of hardwood and softwood lumber in agricultural structures. a. Identify factors that determine grades of lumber. <i>Examples: appearance grade, timber grade, dimension grade</i> b. Identify defects that affect lumber grade. <i>Examples: knot, wane, split, check, warp</i>
Gauges and Types of Metals	3. Determine which metal materials are best suited to various applications in structures, considering appearance, gauge, width, and configurations.
Estimating Materials	4. Calculate a bill of materials for the framing of a structure.
Site Preparation	5. Discuss the purpose and setup of a builder’s level.

Floor Systems

6. Compare advantages of concrete flooring systems and wood flooring systems.
7. Design a wooden floor framing system for a structure.
8. Explain the purpose of a sill.
 - a. Demonstrate the installation of a subfloor for a structure.
9. Design a concrete floor system for a structure.
 - a. Explain the purpose of a footing/foundation.

Wall Framing

10. Design a wall framing system for a structure.
 - a. Compare the use of wood and metal wall framing components.
 - b. Describe the use of a soleplate in structures.
 - c. Describe the construction of post structures.
 - d. Describe the use and installation of wooden and metal studs and posts.
 - e. Describe the installation of double top plates and beams in structures.
 - f. Describe the installation of openings for doors and windows, including headers.
 - g. Describe techniques for bracing a wall.
11. Compare and contrast various wall sheathing materials for structures.

Examples: plywood, foam board, oriented strand board, insulating board
12. Explain the importance of vapor barriers used in framing.
 - a. Compare advantages of using plastic and building felt as vapor barriers in walls.

Ceiling Framing	<p>13. Describe the purpose of a ceiling framing system for a structure.</p> <ul style="list-style-type: none">a. Explain the use of headers in two-story structures, and installation of rough openings for stairs or attic access.
Roof Framing	<p>14. Identify types of roofs used on structures.</p> <p><i>Examples: hip, shed, gable, gambrel</i></p> <p>15. Compare conventional and truss roof systems for structures.</p> <ul style="list-style-type: none">a. Lay out common, hip, and valley rafters.b. Lay out a truss using a framing square.c. Demonstrate the installation of rough openings for vents and skylights. <p>16. Identify various decking materials for roof systems and describe appropriate uses of each material.</p> <p><i>Examples: tongue and groove plywood, plywood, oriented strand board</i></p>
Roofing Materials	<p>17. Describe types of materials used for roof systems.</p> <p><i>Examples: felt, shingles, metal roofing, roll roofing</i></p> <p>18. Outline procedures for installing roofing materials.</p>
Electrical Systems	<p>19. Explain and follow National Electric Code (NEC) safety regulations for performing electrical work safely.</p> <ul style="list-style-type: none">a. Explain the relationship between wire sizes and load limits.b. Install outlets, switches, and fixtures.

**Plumbing
Systems**

20. Repair and maintain water supply and drainage systems, using appropriate materials.

Examples: PVC, metal (black, galvanized), Polybutylene

Introduction to Agricultural Wiring

Course Credit	1.0
Grade Level(s)	9-12
Prerequisites(s)	

Introduction to Agricultural Wiring is designed to provide students with fundamental knowledge and skills in the area of agricultural wiring. This course covers safety, proper tool use, grounding, conduit, boxes and fittings, conductor installation, conductor termination and splices, installation of electrical services, circuit breakers and fuses, and agricultural wiring systems. Upon successful completion of this course, students are able to wire a building with limited supervision.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Introduction to Agricultural Wiring Content Standards

Each content standard completes the stem, “*Students will...*”

Safety

1. Demonstrate safety procedures formulated by governing agencies and established by approved industry standards when testing and replacing components or installing wiring in agricultural applications.
Examples: lockout/tagout
2. Identify electrical hazards and explain ways to avoid or minimize them in the agricultural construction environment.
3. Identify the hazards associated with an arc flash.
 - a. Assess ways to prevent arc flash and ways to minimize its effects.

Grounding

4. Explain the purpose of grounding systems used in agricultural wiring applications.
5. Distinguish between ground faults and short circuits in agricultural wiring applications.
6. Describe the difference between system grounding and equipment grounding related to agricultural wiring.
7. Demonstrate the installation of various grounding devices related to agricultural wiring.

Conduit	<p>8. Explain the purpose of the various types of conduit used in agricultural wiring situations.</p> <p><i>Examples: rigid, flexible; PVC, IMC, flex</i></p> <p>9. Demonstrate the process of bending conduit according to National Electric Code (NEC) specifications.</p>
Box Location and Sizing	<p>10. Demonstrate the ability to locate and install electrical boxes according to the National Electric Code (NEC) handbook.</p> <ul style="list-style-type: none">a. Calculate type and size of electrical boxes based on application, number, and size of conductors using the National Electrical Code (NEC) handbook.b. Explain the importance of National Electric Code (NEC) requirements for supporting lighting.c. Demonstrate the ability to install lighting fixtures according to National Electric Code (NEC) specifications.
Conductor Installation and Connections	<p>11. Select the correct size and type of conductors for agricultural wiring applications according to the National Electric Code (NEC) handbook.</p> <p>12. Demonstrate different methods for installing conductors commonly used in agricultural wiring.</p> <p>13. Create quality conductor terminations.</p> <p>14. Demonstrate the procedure for installing lugs and connectors onto conductors.</p> <p>15. Explain the importance of using correct bolt torque when working with bus bars.</p> <p>16. Demonstrate correct techniques for splicing and crimping conductors.</p>

Electrical Service Entrance	17. Explain the purpose of main disconnects, switches, panel boards, and over-current protection. a. Describe various types of residential electrical service installations. b. Calculate circuit loads for installation of electrical services.
Circuit Breakers and Fuses	18. Identify devices used for over-current protection. 19. Describe the operation of circuit breakers and fuses.
Agricultural Wiring Diagrams	20. Explain reasons for using a wiring diagram to plan and complete a wiring project for agricultural applications.

Introduction to Animal and Dairy Science	
Course Credit	0.5 (Standards 1, 2, 4, 5, 9, 11, 13, 16, and 18 are required) OR 1.0 (All standards are required)
Grade Level(s)	9-12
Prerequisite(s)	

Introduction to Animal and Dairy Science introduces students to the field of livestock production and animal health and welfare. Students participate in activities related to the animal science field as they study the importance of the livestock industry, breed identification and characteristics, nutrition, disease and parasite control, genetics and reproduction, animal rights versus animal welfare, specialty animal production and animal products, livestock facilities and transportation, and regulatory agencies.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Introduction to Animal and Dairy Science Content Standards

Each content standard completes the stem, “*Students will...*”

Importance of Livestock Industry

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| | <ol style="list-style-type: none"> Trace the history of domestication of livestock. Identify livestock by common names and scientific names. Explain livestock production’s economic benefits for entrepreneurs, companies, and communities. |
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Breed Identification and Characteristics

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| | <ol style="list-style-type: none"> Investigate the history of livestock species and breeds. Identify common Alabama livestock breeds and describe characteristics of each one, including physical and behavioral traits. <ol style="list-style-type: none"> Identify characteristics which make certain breeds suited for production in Alabama. Compare and contrast animal body conformation using industry standards for cattle, poultry, and horses. |
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Nutrition

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| | <ol style="list-style-type: none"> Collect, evaluate, and share information about the digestive systems of various livestock species. Formulate proper nutrition and balanced rations for selected animals in various stages of life. |
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Disease and Parasite Control

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| | <ol style="list-style-type: none"> Obtain, evaluate, and share information about common diseases of livestock and methods of prevention. Describe internal and external parasites, how they affect their hosts, and methods of parasite control. |
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Genetics and Reproduction	<p>11. Investigate and share information about current trends and issues in genetic engineering and biotechnology.</p> <p>12. Describe how selective breeding has improved animal genetics, citing examples from several different species.</p>
Animal Rights and Welfare	<p>13. Analyze the differences between animal rights and animal welfare.</p> <p>14. Assess current perceptions concerning animal rights and animal welfare.</p>
Specialty Animals and Animal Products	<p>15. Identify specialty animals and animal products and describe their impact on Alabama's economy.</p> <p>a. Investigate effective means of marketing specialty animals and animal products.</p>
Livestock Facilities and Transportation	<p>16. Assess facilities used to manage, transport, and house livestock to determine their efficiency, safety, and cost effectiveness.</p> <p>17. Investigate and share information about regulations regarding the transportation of livestock.</p>
Regulatory Agencies	<p>18. Identify government agencies that regulate the livestock industry and describe their areas of authority.</p>

Introduction to Veterinary Science

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Introduction to Veterinary Science is designed to familiarize students with the scope, content, and opportunities of the veterinary science profession. Topics include safety, animal welfare, veterinary calculations, animal breed identification, anatomy and physiology, animal health, and laws and regulations.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Introduction to Veterinary Science Content Standards

Each content standard completes the stem “*Students will...*”

Safety	<ol style="list-style-type: none"> 1. Identify safety precautions, procedures, and equipment used by veterinary personnel for handling animals. 2. Discuss the health risks of zoonotic diseases to humans and the historical significance of each disease. 3. Define types of hazards common in the veterinary hospital. 4. Determine the appropriate safety precautions for a given scenario and how to locate important safety information. <p><i>Examples: material safety data sheets, personal protective equipment</i></p>
Animal Welfare	<ol style="list-style-type: none"> 5. Describe responsible animal ownership and management. 6. Discuss the relationship between animal rights and animal welfare.
Veterinary Calculations	<ol style="list-style-type: none"> 7. Apply mathematical skills in the field of veterinary science, including drug dosages, feed rations, conversions, dilutions, and calculations that would commonly be used in a veterinary hospital, and in procedures used in managing the veterinary office, including invoices, cost calculations, and payroll.
Animal Breed Identification	<ol style="list-style-type: none"> 8. Differentiate among major animal breeds and the specific temperament and behavioral characteristics of each breed.

Anatomy and Physiology	<p>9. Describe the body systems of vertebrate animals and the function of each system.</p> <p>10. Define directional anatomical terms.</p>
Animal Health	<p>11. Identify disease-prevention procedures that ensure animal health.</p> <p><i>Examples: immunizations, biosecurity, herd-health plans, trimming hooves</i></p> <p>a. Describe normal and abnormal parameters of animal health.</p> <p><i>Examples: heart rate, body temperature, body condition scores, respiratory rate, FAMACHA scores</i></p> <p>12. Demonstrate clinical procedures for administering vaccinations and medications.</p>
Laws and Regulations	<p>13. Summarize federal, state, and local laws that regulate policies and procedures in veterinary medicine pertaining to animal rights and welfare, professional licensing, and veterinary liability, including applicable regulations issued by the U.S. Food and Drug Administration, U.S. Dept. of Agriculture, Environmental Protection Agency, and Occupational Safety and Health Administration.</p>

Landscape Design and Management

Course Credit	1.0
Grade Level(s)	9-12
Prerequisites(s)	

Landscape Design and Management prepares students to create, install, and manage various types of landscape plans and features. Topics include facilities, irrigation, tools and equipment, landscape establishment, plant identification, design, business management, maintenance, environmental issues, and technology.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Landscape Design and Management Content Standards

Each content standard completes the stem “*Students will...*”

Plant Identification	<ol style="list-style-type: none">1. Identify common landscape plants and turfgrasses by common names.2. Describe physical and cultural characteristics of landscape plants and turfgrass. <i>Examples: hardiness, mature size, sun/shade requirements, fruiting, native, invasive, drought-tolerance</i>
Design	<ol style="list-style-type: none">3. Demonstrate principles of design and elements of art in landscape design.<ol style="list-style-type: none">a. Incorporate simplicity, balance, focal point, rhythm and line, scale and proportion, and unity in landscape design.b. Incorporate public areas, private areas, service areas, family living areas, and handicap accessibility in designs.4. Create a landscape design, considering maintenance requirements, preservation of existing trees (when possible), inclusion of native plants, and other factors that impact the cost and success of the design.<ol style="list-style-type: none">a. Measure and record lengths and distances in landscape design to scale.b. Use symbols to represent major landscape features.5. Calculate the landscape materials, area, number of plants, and cost of plants and features in a landscape design.

**Tools and
Equipment**

6. Identify tools and equipment used in the landscape industry.
7. Demonstrate basic maintenance procedures required for tools and equipment used in the landscape industry.
Examples: cleaning, sharpening blades, mixing gas, changing oil

**Landscape
Establishment**

8. Demonstrate proper methods for planting landscape plants.
Examples: choosing proper location, planting to correct depth, staking, guying, watering in

Maintenance

9. Select appropriate types of fertilizers and methods of application for various situations in the landscape industry.
10. Describe techniques used for maintaining the landscape.
Examples: pruning, mulching, pest control, weed management
11. Diagnose pest problems and treat using Integrated Pest Management (IPM) strategies.
12. Compare and contrast different irrigation systems and summarize their advantages and disadvantages.
 - a. Design an irrigation system for a residential landscape and develop a bid presentation that identifies the project timeline, required permits, and costs of installation and materials.
13. Demonstrate basic maintenance and repair of irrigation systems used in the landscape and turf industry.
Examples: repairing broken pipes, changing sprinkler heads, winterizing systems
14. Maintain, operate, and repair facilities and equipment used in landscape management.

Business Management	<p>15. Compare and contrast different business models and create a chart to illustrate the uses, advantages, and disadvantages of each.</p> <p>16. Using industry-specific terminology, explain the process for preparing a price estimate for landscape designs and packages.</p> <p>a. Create a price estimate and develop a presentation to secure a bid on a landscape project.</p>
Environmental Issues	<p>17. Obtain, evaluate, and share information on environmental issues related to landscape design and management.</p> <p><i>Example: use of pesticides, fertilizers; water quality; noise abatement</i></p>
Technology	<p>18. Identify technological advancements that enhance the landscape industry.</p> <p><i>Examples: computer automated design, phone apps, automated equipment.</i></p>

Plant Biotechnology

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Plant Biotechnology familiarizes students with botany and plant biotechnology. Topics include plant classification, plant cells and tissues, needs, responses to stimuli, importance of plants, plant disease, biotechnology advancement, and applied genetics and biotechnology concepts.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Plant Biotechnology Content Standards

Each content standard completes the stem “*Students will...*”

Plant Classification

1. Obtain, evaluate, and communicate information to explain the importance of using a universal classification system.
2. Use a plant dichotomous key as a model to identify various local plants.
3. Develop and use models to classify plants as vascular or nonvascular, seed-bearing or spore-bearing, and gymnosperms or angiosperms.
4. Germinate monocots and dicots and use offspring as models to contrast the characteristics of each.
5. Describe phylogenetic relationships between plants and other organisms.
 - a. Describe mutualism among algae and fungi in lichens.
6. Describe plant adaptations required for life on land.
 - a. Describe the alternation of generations in plants.
7. Differentiate among types of roots, stems, and leaves.

Plant Cells and Tissues

8. Obtain and communicate information describing adaptations that allow a specific plant to live in a particular habitat.
Examples: seaweed adapted for saltwater, cacti adapted for desert environment
9. Use models to illustrate and communicate the role of plant cell processes including glycolysis, aerobic and anaerobic respiration, transport, and light-dependent and light-independent reactions of photosynthesis.
10. Differentiate among major types of plant tissues found in roots, stems, and leaves and investigate effective culturing techniques for each type.
Examples: parenchyma, sclerenchyma, collenchyma

Plant Needs	11. Explain why soil type, texture, and nutrients are important considerations in growing plants. <ul style="list-style-type: none">a. Describe water and mineral absorption in plants.b. Distinguish between capillary and turgor pressure.
Plant Responses to Stimuli	12. Hypothesize, test, and report on plant responses to various stimuli. <ul style="list-style-type: none">a. Identify effects of hormones on plant growth.b. Differentiate among phototropism, gravitropism, thigmotropism, and thermotropism.
Plant Reproduction	13. Compare and contrast life cycles of mosses, ferns, gymnosperms, and angiosperms. 14. Compare the structures of flowers and the functions of their parts. <ul style="list-style-type: none">a. Describe seed germination, development, and dispersal. 15. Propagate plants by various natural and artificial methods.
Importance of Plants	16. Engage in argument from evidence to evaluate ecological and economic importance of plants. 17. Obtain, evaluate, and communicate information to describe how human activity may affect biodiversity and genetic variation of plants, including threatened and endangered species.
Plant Disease	18. Use models to compare and contrast the structural characteristics of viral, fungal, and bacterial organisms that cause plant disease and determine the detrimental effects of each.

<p>Biotechnology Advancement</p>	<p>19. Research and communicate information about the historical development of plant biotechnology.</p> <p>20. Engage in argument from evidence to explain the positive and negative effects of labeling genetically modified organisms for import and export.</p> <p>21. Evaluate effects of plant hormones on animal and human growth and development.</p> <p>22. Construct and elaborate on a thesis statement that describes how public perception of product safety and desirability affects producers' decisions on marketing, sales, labeling, and government regulations regarding plant and animal products grown in the United States.</p> <p>23. Obtain and communicate information about significant biotechnological advancements in the food and medical industries.</p>
<p>Applied Genetics and Biotechnology Concepts</p>	<p>24. Investigate methods of genetic engineering and analyze their effectiveness to determine which are best suited for different types of plants.</p> <p>25. Construct an explanation of hybridization and describe how it relates to plant biotechnology.</p> <p>26. Evaluate plant properties to be considered when determining which varieties will produce superior harvests.</p> <p><i>Examples: cold tolerance, salt tolerance, ripening rate, starch content</i></p>
<p>Social and Environmental Impacts of Biotechnology</p>	<p>27. Examine public agencies that conduct research and regulate the use of plant biotechnology to determine the areas of authority for each.</p> <p><i>Examples: United States Department of Agriculture (USDA), Environmental Protection Agency (EPA), Food and Drug Administration (FDA).</i></p>

Poultry Industrial Maintenance

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	Agricultural Industrial Maintenance

Poultry Industrial Maintenance prepares students for entry-level employment or advanced training in the poultry industrial maintenance technologies field. Topics include identification and proper use of power and stationary equipment, interpreting technical information, electricity, construction, plumbing, mechanical theory and application, pneumatics, hydraulics, and refrigeration.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none">1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; utilizing materials and protective equipment; maintaining a safe work area; and handling hazardous materials and forces.2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Poultry Industrial Maintenance Content Standards

Each content standard completes the stem “*Students will...*”

Tools	1. Identify the tools and equipment used to maintain poultry facilities and machinery.
Interpretation of Technical Information	2. Explain how to use an industrial maintenance manual for poultry machinery and equipment. 3. Interpret instructions from maintenance manuals, orally and in writing. 4. Apply recommended maintenance techniques used in troubleshooting problems with poultry machinery.
Electricity	5. Apply electrical concepts, including Ohm’s Law, AC power, and DC power. 6. Apply industrial wiring techniques for completing basic electrical circuits. <ul style="list-style-type: none"> a. Interpret basic motor and circuit schematics for poultry equipment. b. Complete motor control circuits. c. Troubleshoot basic issues involving controls, sensors, and relays in poultry equipment.
General Construction	7. Interpret and apply construction plans to build poultry facilities. <i>Examples: Create a plan for a generator shed, construct a backyard pen.</i>

Plumbing Systems	<p>8. Repair fluid supply and drainage systems in poultry facilities, explaining procedures orally and in writing.</p> <p>a. Maintain plumbing systems in poultry facilities.</p>
Mechanical Theory and Application	<p>9. Demonstrate procedures for lubricating bearings in poultry industry machinery.</p>
Refrigeration	<p>10. Discuss the basic theory and application of refrigeration systems, including condensers, accumulators, evaporators, compressors, metering valves, and high/low pressure lines, in the poultry industry.</p> <p>11. Discuss the various types of refrigerants used in industrial applications in the poultry industry.</p> <p>12. Identify tools and methods used for charging cooling equipment and recovering refrigerants in the poultry industry and summarize EPA regulations for these processes.</p>
Mechanical Systems	<p>13. Discuss the basic theory and application used in the various drive systems in machinery used in the poultry industry, including belt and chain drives, clutch drives, chain braking, gear reduction, and feed and discharge devices.</p>
Waste Disposal	<p>14. Discuss methods for disposing of carcass and chicken litter and assess the environmental impacts of each method.</p>

Poultry Science	
Course Credit	0.5 (Standards 1, 2, 3, 6, 8, 9, 10, 16, 18, and 21 required) OR 1.0 (All standards required)
Grade Level(s)	9-12
Prerequisites(s)	

Poultry Science allows students to discover of the importance of the poultry industry and to obtain basic knowledge of the issues and processes involved in poultry production. Topics include safety concerns related to poultry production, history and development, marketing and management, classification of poultry, environmental issues, disease prevention and nutrition, poultry production facilities, and consumer issues.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Poultry Science Content Standards

Each content standard completes the stem “*Student will...*”

Safety	<ol style="list-style-type: none"> 1. Design and evaluate a biosecurity plan for a poultry production operation to prevent incidents arising from natural circumstances or from bioterrorism, utilizing information from federal and state security and agriculture agencies. 2. Research and share information about safe procedures for transporting poultry.
History and Development	<ol style="list-style-type: none"> 3. Summarize historical and scientific milestones in the poultry industry, including the development of products and services. 4. Examine potential effects of current trends and possible future developments on production practices and the poultry house environment. <i>Examples: waste management, genetics, energy management, construction, animal welfare, consumer opinion</i>
Marketing and Management	<ol style="list-style-type: none"> 5. Obtain, evaluate, and share information about marketing methods for poultry products and services. <i>Examples: conventional, niche markets, locally grown</i> 6. Research and share information about vertical integration of the poultry industry and the agreements between producers and processors. 7. Devise and evaluate marketing plans for poultry products.

	<p>8. Assess the impact of poultry production factors on the quality of products sold to the consumer. <i>Examples: price, sustainability, marketing, labeling, animal welfare</i></p>
Classification of Poultry	<p>9. Identify various breeds of poultry, including chickens, ducks, geese, quail, and turkeys.</p> <p>10. Categorize poultry using terms commonly utilized in the industry. <i>Examples: waterfowl, upland fowl, layers, broilers</i></p> <p>11. Compare and contrast desirable and undesirable anatomical and physiological characteristics of poultry.</p>
Environmental Issues	<p>12. Explain procedures for disposal of poultry litter, including spreading wet, dry, and dehydrated litter to prevent environmental contamination.</p> <p>13. Explain procedures for disposal of dead birds, including composting, incineration, and freezing, to prevent environmental contamination.</p>
Disease Prevention and Nutrition	<p>14. Differentiate among nutritional needs of poultry at various stages of growth and in various production systems.</p> <p>15. Identify common illnesses and disorders of poultry based on symptoms. a. Identify problems caused by wounds and parasites and discuss methods of dealing with them.</p> <p>16. Design health maintenance protocols for poultry housed in natural and confined environments.</p> <p>17. Collect, evaluate, and share information about the effectiveness of poultry processing procedures designed to avoid the spread of bacterial and viral infections.</p>

Facilities	<p>18. Critique designs for poultry facilities and devise adjustments and alternative layouts for the safe, sustainable, and efficient use of the facility.</p> <p>19. Design a poultry production facility.</p> <ul style="list-style-type: none">a. Evaluate equipment and technology to be included in a poultry production facility.b. Describe biotechnological advancements in poultry science.
Consumer Issues	<p>20. Collect and share information about governmental regulations and their impacts on the poultry industry.</p> <p>21. Explain the importance of consumer education and community relations in the poultry industry.</p>

Residential and Commercial Power Equipment

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Residential and Commercial Power Equipment prepares students for entry-level employment or advanced training in the field of power equipment mechanics. Topics include lawn machines chassis, chain saw, string trimmer, tillers, generators, pumps, Environmental Protection Agency (EPA) pollution controls, electrical systems, and electrical system repair on power equipment.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Residential and Commercial Power Equipment Content Standards

Each content standard completes the stem “*Students will...*”

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| | <ol style="list-style-type: none">1. Diagnose frame and sheet metal problems in power equipment.<ol style="list-style-type: none">a. Repair frame and sheet metal problems in power equipment and explain procedures used, orally and in writing.2. Diagnose cutting-deck problems in power equipment.<ol style="list-style-type: none">a. Demonstrate procedures for correcting cutting-deck problems. |
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Chain Saws

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| | <ol style="list-style-type: none">3. Diagnose chain saw problems and explain how the problems were identified.<ol style="list-style-type: none">a. Demonstrate procedures for correcting chain saw problems. |
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String Trimmers

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| | <ol style="list-style-type: none">4. Diagnose string trimmer problems.<ol style="list-style-type: none">a. Demonstrate procedures for correcting string trimmer engine problems.b. Demonstrate procedures for correcting tube and cutting-head problems. |
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Tillers	<ul style="list-style-type: none">5. Diagnose tiller problems.<ul style="list-style-type: none">a. Demonstrate procedures for correcting tiller engine problems.
Generators	<ul style="list-style-type: none">6. Diagnose output problems in generators.7. Demonstrate procedures for correcting engine problems in generators.
Pumps	<ul style="list-style-type: none">8. Calculate the output pressure of various pumps.9. Demonstrate procedures for rebuilding various pumps.
Electrical Systems	<ul style="list-style-type: none">10. Discuss Ohm's law.<ul style="list-style-type: none">a. Apply Ohm's law to series and parallel circuits.b. Diagnose electrical problems in power equipment.11. Demonstrate procedures for repairing power equipment electrical systems.
Oxyfuel Equipment	<ul style="list-style-type: none">12. Explain and demonstrate techniques for using oxyfuel equipment safely.13. Perform a variety of oxyfuel tasks, including heating, cutting, welding, and brazing metal.
Noise and Pollution Control	<ul style="list-style-type: none">14. Describe Environmental Protection Agency (EPA) noise and pollution control systems for power equipment and explain why using and maintaining these systems is important.

Turfgrass Management	
Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Turfgrass Management prepares students to install and maintain turfgrass in a variety of settings. Topics in Turfgrass Management include turfgrass identification, establishment, maintenance, tools and equipment, and business management.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations, learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
	2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
	3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
	4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
	5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
	6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.

Turfgrass Management Content Standards

Each content standard completes the stem “*Students will...*”

<p>Turfgrass Identification</p>	<ol style="list-style-type: none"> 1. Identify common turfgrass names and characteristics, and describe uses of warm and cool season grasses. <ol style="list-style-type: none"> a. Compare hardiness zones among turfgrass species. b. Classify grasses based on reproduction methods. <p><i>Examples: rhizomes, stolons, bunches, seed, sprigs</i></p>
<p>Turfgrass Establishment</p>	<ol style="list-style-type: none"> 2. Identify soil preparation techniques for turfgrass. <p><i>Examples: grading, drainage, amendments</i></p> <ol style="list-style-type: none"> a. Assess methods of establishing turfgrass, noting advantages and disadvantages of seeding, sodding, and sprigging.
<p>Turfgrass Maintenance</p>	<ol style="list-style-type: none"> 3. Summarize proper maintenance techniques for residential, commercial, and sports turf. <p><i>Examples: top dressing, aeration, irrigation scheduling</i></p> <ol style="list-style-type: none"> a. Create a turfgrass maintenance schedule, including watering, fertilizing, and cutting. b. Demonstrate correct mowing procedures for turfgrass. <p><i>Examples: proper mowing height, direction, frequency</i></p> 4. Identify common problems in turfgrass cultivation, including diseases, weeds, nutritional deficiencies, and environmental factors, and describe options for preventing and treating them.

**Tools and
Equipment**

5. Describe and demonstrate safe and economical use of commercial and residential equipment to install and maintain turf in a variety of settings.
Examples: reel mower, rotary mower, string trimmer, sprayer
6. Demonstrate routine maintenance of turfgrass equipment.

**Business
Management
Practices**

7. Discuss the importance of business management skills to the turfgrass manager.
8. Create cost estimates for large and small projects in the turfgrass industry.
9. Demonstrate how to plan work schedules and maintenance schedules.
10. Prepare a budget for a turf management business, including insurance, advertising, and equipment acquisition and depreciation.

Urban Forestry

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Urban Forestry is designed to enable students to acquire forestry knowledge and skills for use in an urban setting. Topics include safety, climbing and rigging, urban tree management, and tree disorders.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Urban Forestry Content Standards

Each content standard completes the stem “*Students will...*”

Safety	<ol style="list-style-type: none"> 1. Explain key provisions of arborist safety standards, including International Society of Arboriculture (ISA) regulations.
Climbing and Rigging	<ol style="list-style-type: none"> 2. Analyze tree-climbing techniques, and indicate which techniques should be used in specific applications. 3. Describe and explain the purpose of climbing equipment used by arborists, including saddles, lanyards, snaps, ropes, and ascenders. 4. Demonstrate rigging techniques used by arborists. <i>Examples: rope-positioning, false-crotch, speed-lining</i> <ol style="list-style-type: none"> a. Tie various types of knots and assemble hitches used by arborists. b. Explain the concepts of tensile strength, working loads, and shock loads of ropes used by arborists. c. Identify rigging equipment and explain the purpose of each part. <i>Examples: carabiners, slings, block-and-tackle, figure-eight descenders, lowering devices.</i>
Urban Tree Management	<ol style="list-style-type: none"> 5. Compare and contrast management issues, concerns, and strategies in urban and rural forestry. 6. Obtain and share information about tree removal methods, including which methods would be most effective in given situations.

	<ol style="list-style-type: none"> 7. Describe appropriate situations for cabling and bracing a tree. <ol style="list-style-type: none"> a. Describe the equipment needed for cabling and bracing a tree and indicate the purpose and function of each component. b. Demonstrate tree-cabling and tree-bracing techniques. 8. Apply concepts of effective tree pruning. <ol style="list-style-type: none"> a. Demonstrate tree-pruning cuts. b. Identify the appropriate times for pruning various species of trees. c. Identify types and uses of tree-pruning tools. 9. Determine appropriate trees for various urban and suburban environments, considering size, longevity, fruiting, and required upkeep. 10. Design a landscape plan for a wooded urban environment. <ol style="list-style-type: none"> a. Describe skills needed to carry out urban forest projects.
<p>Tree Disorders</p>	<ol style="list-style-type: none"> 11. Describe major tree disorders and indicate their causes. <ol style="list-style-type: none"> a. Compare growth patterns of normal and diseased trees. b. Identify tree defense systems. <p><i>Examples: rays and rings</i></p> 12. Obtain, evaluate, and share information about insects, diseases, parasites, and weeds that afflict trees. <ol style="list-style-type: none"> a. Describe methods of pest management in urban forestry, including mechanical, biological, and chemical treatments and genetically engineered resistance. b. Obtain and share information about regulations governing the use of chemicals to manage pests, diseases, and weeds.

Veterinary Science

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	Introduction to Veterinary Science

Veterinary Science is designed to prepare students for entry-level employment or for advanced training as veterinary assistants. Topics include safety, medical terminology, scientific classification, health and disease, anatomy and physiology, applied clinical mathematics, anesthesiology and basic surgical procedures, business management practices, veterinary law and ethics, and applications of technology.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards	<ol style="list-style-type: none"> 1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing. 4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically. 5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning.
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Veterinary Science Content Standards

Each content standard completes the stem “*Students will...*”

Safety	<ol style="list-style-type: none"> 1. Identify hazards in the veterinary clinic and in a field setting; list safety precautions and procedures that protect animals and veterinary personnel. 2. Perform routine animal handling and restraint procedures. 3. Research, evaluate, and share information about the importance of biosecurity in the veterinary field. 4. Demonstrate the ability to follow procedures for sanitation, disinfection, and sterilization to prevent the transfer of zoonotic diseases.
Medical Terminology	<ol style="list-style-type: none"> 5. Obtain and communicate information to explain common medical terminology, abbreviations, and symbols relating to the diagnosis, pathology, and treatment of animals.
Scientific Classification	<ol style="list-style-type: none"> 6. Use dichotomous keys to classify animals by their physical characteristics and to determine levels of taxonomy. <ol style="list-style-type: none"> a. Gather and communicate information regarding the various breeds of domestic animal species.

<p>Health and Disease</p>	<ol style="list-style-type: none"> 7. Investigate how common viral, bacterial, and fungal diseases affect animals and summarize methods of prevention, treatment, and control of diseases. 8. Develop and use models to explain the life cycles of internal and external parasites to determine effective treatment, prevention, and control. 9. Analyze and interpret data for normal parameters of temperature, pulse, respiration, and animal behavior as a basis for recognizing abnormal readings or behaviors. 10. Engage in argument to defend the need for conducting urinalyses and fecal exams for diagnosing issues related to animal health. 11. Assess common physical injuries, including lacerations, abrasions, and bite wounds, then select basic first aid options, wound care methods, and bandaging procedures for each injury. <ol style="list-style-type: none"> a. Use models to compare and contrast wounds at different phases of healing to determine necessary wound therapy. b. Construct an explanation that describes types and purposes of bandages, splints, slings, casts, and Elizabethan collars to determine indications for the use of each.
<p>Anatomy and Physiology</p>	<ol style="list-style-type: none"> 12. Construct representations of major body systems of various domestic animals and describe the functions of each. <i>Examples: skeletal, muscular, respiratory, digestive, nervous, integumentary, urinary, and reproductive system.</i> 13. Illustrate and describe gestation stages in various domestic animals. 14. Construct an explanation of proper post-partum care for various domestic animals.
<p>Applied Clinical Mathematics</p>	<ol style="list-style-type: none"> 15. Use mathematical calculations to formulate dosages, concentrations, and dilutions; compute costs; and prepare invoices for veterinary practice.

<p>Anesthesiology and Basic Surgical Procedures</p>	<p>16. Construct explanations based on evidence from investigations regarding types, indications, and contraindications of anesthesiology for surgery and in certain grooming situations.</p> <p>17. Obtain, evaluate, and communicate information to describe basic surgical procedures for selected domestic animals.</p> <p><i>Examples: caesarean section, castration, spaying, nail and claw removal</i></p>
<p>Business Management Practices</p>	<p>18. Construct explanations of procedures for collecting and analyzing data for maintaining accurate animal health records.</p> <p><i>Examples: inventory, surgical authorization forms</i></p> <p>19. Obtain and communicate information regarding the impact of proper financial management in the veterinary workplace, citing examples of effective and ineffective procedures.</p> <p>20. Investigate and describe elements of effective patient care, client relations, and management of veterinary facilities, including effective communication with specific age groups among pet owners.</p>
<p>Veterinary Law and Ethics</p>	<p>21. Engage in argument from evidence to debate the philosophical, social, moral, and ethical issues encountered in the veterinary profession.</p> <p><i>Example: animal rights and welfare</i></p> <p>22. Cite specific textual evidence from legislation and news media to summarize local, state, and federal laws that regulate the practice of veterinary medicine.</p> <p><i>Examples: professional licensing and state boards; liability of veterinary staff; policies and regulations from U.S. Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), the Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA)</i></p>

**Applications of
Technology**

23. Research and communicate information about the impact of emerging technologies on veterinary science, including advances in equipment, procedures, and healthcare.

Examples: genetic engineering, digital x-rays, stem cell therapy

Wildland Firefighting and Controlled Fire

Course Credit	1.0
Grade Level(s)	9-12
Prerequisite(s)	

Wildland Firefighting and Controlled Fire is designed to give students a working knowledge of wildland firefighting and the use of controlled fires on forest lands. Topics include firefighting terminology, topography, fire behavior, personal protective equipment, chain of command, firefighting tools and equipment, suppression tactics, property preservation techniques, and prescribed burning.

Foundational standards, shown in the chart below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership and take advantage of the opportunities afforded by Career and Technical Student Organizations. Also, students will learn and practice essential digital skills, and participate in supervised projects which allow them to put into practice the skills and knowledge acquired in the classroom, shop, and lab. The foundational standards are to be incorporated throughout the course.

Foundational Standards

1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
4. Demonstrate digital literacy by using digital and electronic tools appropriately, safely, and ethically.
5. Participate in a Career Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

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| | 6. Participate in Supervised Agricultural Experiences and/or work-based, experiential, and service learning. |
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Wildland Firefighting and Controlled Fire Content Standards

Each content standard completes the stem “*Students will...*”

Terminology

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| | <ol style="list-style-type: none">1. Define the basic terminology pertaining to wildland firefighting.2. Identify the parts of a wildfire.3. Define and explain the parts of the Fire Triangle. |
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Topography

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| | <ol style="list-style-type: none">4. Demonstrate the ability to read and interpret a topographical map.5. Describe the effects of various types of topography on wildland fire behavior. |
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Fire Behavior

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| | <ol style="list-style-type: none">6. Identify the basic types and characteristics of fuel and describe how they influence fire behavior.7. Describe the effects of weather factors on fire behavior, including temperature, relative humidity, precipitation, and wind.<ol style="list-style-type: none">a. List environmental factors to be considered when monitoring fire behavior.8. Describe critical fire weather conditions.<ol style="list-style-type: none">a. Explain the conditions and precautions indicated by different types of weather forecasts and outlooks.9. Identify indicators of fire spread and growth.<p><i>Examples: smoke production and color, wind, temperature, moisture, air pressure</i></p> |
|--|---|

	10. Describe influences that may combine to cause extreme fire behavior and dangerous conditions.
Personal Protective Equipment (PPE)	<p>11. Develop a list of personal protective equipment and gear needed in wildland firefighting and describe the function of each item.</p> <ul style="list-style-type: none">a. Explain the importance of proper use and maintenance of personal protective equipment. <p>12. Explain the firefighter's accountability for personal and agency property.</p>
Chain of Command	<p>13. Explain the firefighting chain of command.</p> <ul style="list-style-type: none">a. Describe the general responsibilities of each section in the Incident Command System of the USDA Forestry Service Wildland Firefighting Handbook.b. Create a management plan for mandatory evacuation of the population of a given area. <p>14. Explain the Standard Firefighting Orders for watch-out situations.</p> <p><i>Examples: lookouts, communications, escape routes, safety zones</i></p> <ul style="list-style-type: none">a. Investigate standard firefighter orders and watch-out situations.
Tools and Equipment	<p>15. Demonstrate the correct procedures for deploying fire shelters.</p> <p>16. Use standard firefighting tools to construct a minimum of 25 feet of fire break.</p> <p>17. Demonstrate the proper use of a drip torch.</p> <p>18. Extinguish a fire using a backpack pump.</p> <p>19. Describe the use of technology in wildland firefighting situations and explain its advantages and disadvantages.</p> <p><i>Examples: drones, global positioning systems, geographic information systems</i></p>

Suppression Tactics	<p>20. Demonstrate basic wildland fire suppression tactics.</p> <p>21. Demonstrate fire-line patrolling procedures.</p> <p>22. Demonstrate fire mop-up procedures.</p>
Property Preservation Techniques	<p>23. Identify prevention methods to protect structures and personal property from wildfires.</p> <p><i>Example: landscaping, nonflammable building materials, fire plans</i></p>
Prescribed Burning	<p>24. Explain the purposes and benefits of prescribed burning.</p> <p>25. Assess conditions to determine when prescribed burning is safe.</p> <p>26. Demonstrate prescribed burning methods.</p> <p>27. Evaluate the results of a prescribed burn.</p>

RESOURCES

Alabama Association of Agricultural Educators	www.alaged.org	Forestry Works	www.forestryworks.com
Alabama Cattleman Association	www.bamabeef.org	Georgia Ag Ed	www.gaaged.org/curriculum/
Alabama Cooperative Extension System	www.aces.edu	Green Industry Web Portal	www.giwportal.org
Alabama Farmers Cooperative	www.alafarm.com	Hazardous Occupations Safety Training in Agriculture	www.nifa.usda.gov
Alabama Farmers Federation	www.alfafarmers.org	Hunter Education	www.outdooralabama.com
Alabama FFA Association	www.alabamaffa.org	iCEV Online	www.icevonline.com
Alabama FFA Graphic Art Technician	www.alabamaffa.org/resources	Internet Computing Core Certification (IC3)	www.nrclc.com
Alabama Forestry Commission	www.forestry.alabama.gov	Miller Welding Educational Resource	www.millerwelds.com/industries
Alabama Junior Master Gardener	www.aces.edu	National Association of Agricultural Educators	www.naae.org
Alabama Learning Exchange	www.alex.state.al.us	National Center for Construction Education and Research	www.nccer.org
Alabama Water Watch Credential	www.aces.edu	National FFA Organization	www.ffa.org
Aquaculture Training and Online Learning	www.udemy.com	Natural Resources Conservation and Soils	www.nrcs.usda.gov
Beef Quality Assurance	www.bqa.org	Occupational Safety and Health Administration	www.osha.gov
Bonnie Plant Farm	www.bonnieplants.com	The Agricultural Experience Tracker	www.theaet.com
Briggs and Stratton	www.thepowerportal.com	United States Department of Agriculture	www.usda.gov
California Tool ID	http://ag.csuchico.edu/agmech/	Virginia Tech Laboratory Safety Resources	www.alce.vt.edu
Canine Care and Training Program	www.ckcusa.com		

ALABAMA HIGH SCHOOL GRADUATION REQUIREMENTS

<i>(Alabama Administrative Code 290-3-1-02(8) and (8)(a))</i>		
Effective for students in the ninth grade in the 2013-2014 school year, all students shall earn the required credits for the Alabama High School Diploma. A local board of education may establish requirements for receipt of diplomas and endorsements, but any diploma or endorsement shall include the requirements of the Alabama High School Diploma. The Alabama courses of study shall be followed in determining minimum required content in each discipline.		
	COURSE REQUIREMENTS	
English Language Arts	Four credits to include:	Credits
	English 9	1
	English 10	1
	English 11	1
	English 12	1
	<i>Equivalent options may include: Advanced Placement/International Baccalaureate/postsecondary equivalent courses</i>	
English Language Arts Total Credits		4
Mathematics	Three credits to include:	Credits
	Algebra I or its equivalent	1
	Geometry or its equivalent	1
	Algebra II w/Trigonometry or Algebra II, or its equivalent	1
	One credit from:	
	<i>Alabama Course of Study: Mathematics or Career and Technical Education/Advanced Placement/International Baccalaureate/postsecondary equivalent courses</i>	1
Mathematics Total Credits		4
Science	Two credits to include:	Credits
	Biology	1
	A physical science (Chemistry, Physics, Physical Science)	1
	Two credits from:	
	<i>Alabama Course of Study: Science or Career and Technical Education/Advanced Placement/International Baccalaureate/postsecondary equivalent courses</i>	2
	Science Total Credits	4
Social Studies	Four credits to include:	Credits
	World History	1
	United States History I	1
	United States History II	1
	United States Government	0.5
	Economics	0.5
	<i>Equivalent options may include: Advanced Placement/International Baccalaureate/postsecondary equivalent courses</i>	
Social Studies Total Credits		4
Physical Education	Lifelong Individualized Fitness Education (LIFE)	1
Health Education		0.5
Career Preparedness		1
Career and Technical Education and/or Foreign Language and/or Arts Education		3
Electives		2.5
<i>Local boards shall offer foreign languages, arts education, physical education, wellness education, career and technical education, and driver education as electives.</i>		
Total Credits		24

GUIDELINES AND SUGGESTIONS FOR LOCAL TIME REQUIREMENTS AND HOMEWORK

Total Instructional Time

The total instructional time of each school day in all schools and at all grade levels shall be not less than 6 hours or 360 minutes, exclusive of lunch periods, recess, or time used for changing classes (*Code of Alabama*, 1975, §16-1-1).

Suggested Time Allotments for Grades 1 – 6

The allocations below are based on considerations of a balanced educational program for Grades 1-6. Local school systems are encouraged to develop a general plan for scheduling that supports interdisciplinary instruction. Remedial and/or enrichment activities should be a part of the time scheduled for the specific subject area.

<u>Subject Area</u>	<u>Grades 1-3</u>	<u>Grades 4-6</u>
Language Arts	150 minutes daily	120 minutes daily
Mathematics	60 minutes daily	60 minutes daily
Science	30 minutes daily	45 minutes daily
Social Studies	30 minutes daily	45 minutes daily
Physical Education	30 minutes daily*	30 minutes daily*
Health	60 minutes weekly	60 minutes weekly
Technology Education (Computer Applications)	60 minutes weekly	60 minutes weekly
Character Education	10 minutes daily**	10 minutes daily**

Arts Education

Dance Music Theatre Visual Arts	<i>Daily instruction with certified arts specialists in each of the arts disciplines is the most desirable schedule. However, schools unable to provide daily arts instruction in each discipline are encouraged to schedule in Grades 1 through 3 two 30- to 45-minute arts instruction sessions per week and in Grades 4 through 6 a minimum of 60 minutes of instruction per week. Interdisciplinary instruction within the regular classroom setting is encouraged as an alternative approach for scheduling time for arts instruction when certified arts specialists are not available.</i>
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*Established by the Alabama State Department of Education in accordance with *Code of Alabama*, 1975, §16-40-1

**Established by the Alabama State Department of Education in accordance with *Code of Alabama*, 1975, §16-6B-2(h)

Kindergarten

In accordance with *Alabama Administrative Code* r. 290-5-1-.01(5) Minimum Standards for Organizing Kindergarten Programs in Alabama Schools, the daily time schedule of the kindergartens shall be the same as the schedule of the elementary schools in the systems of which they are a part since kindergartens in Alabama operate as full-day programs. There are no established time guidelines for individual subject areas for the kindergarten classroom. The emphasis is on large blocks of time that allow children the opportunity to explore all areas of the curriculum in an unhurried manner.

It is suggested that the full-day kindergarten program be organized utilizing large blocks of time for large groups, small groups, center time, lunch, outdoor activities, snacks, transitions, routines, and afternoon review. Individual

exploration, small-group interest activities, interaction with peers and teachers, manipulation of concrete materials, and involvement in many other real-world experiences are needed to provide a balance in the kindergarten classroom.

Grades 7-12

One credit may be granted in Grades 9-12 for required or elective courses consisting of a minimum of 140 instructional hours or in which students demonstrate mastery of Alabama course of study content standards in one credit courses without specified instructional time (*Alabama Administrative Code* r. 290-3-1-.02 (9)(a)).

In those schools where Grades 7 and 8 are housed with other elementary grades, the school may choose the time requirements listed for Grades 4-6 or those listed for Grades 7-12.

Character Education

For all grades, not less than 10 minutes instruction per day shall focus upon the students' development of the following character traits: courage, patriotism, citizenship, honesty, fairness, respect for others, kindness, cooperation, self-respect, self-control, courtesy, compassion, tolerance, diligence, generosity, punctuality, cleanliness, cheerfulness, school pride, respect of the environment, patience, creativity, sportsmanship, loyalty, and perseverance.

Homework

Homework is an important component of every student's instructional program. Students, teachers, and parents should have a clear understanding of the objectives to be accomplished through homework and the role it plays in meeting curriculum requirements. Homework reflects practices that have been taught in the classroom and provides reinforcement and remediation for students. It should be student-managed, and the amount should be age-appropriate, encouraging learning through problem-solving and practice.

At every grade level, homework should be meaning-centered and mirror classroom activities and experiences. Independent and collaborative projects that foster creativity, problem-solving abilities, and student responsibility are appropriate. Parental support and supervision reinforce the quality of practice or product as well as skill development.

Each local board of education shall establish a policy on homework consistent with the Alabama State Board of Education resolution adopted February 23, 1984 (Action Item #F-2).

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Glossary

Acetylene (C₂H₂): Gas composed of two parts of carbon and two parts of hydrogen. When acetylene is burned in an atmosphere of oxygen, it produces one of the highest flame temperatures obtainable.

Agricultural Experience Tracker (AET): A personalized, online FFA record system for managing time, finances, and experiences in agricultural education.

Alternating current (AC): Electric current that changes direction at regular intervals.

Ampere: Unit of electrical current. One ampere is required to flow through a conductor having a resistance of one ohm at a potential (pressure) of one volt.

Annual: A plant that completes its life cycle, from germination to the production of seeds, within one growing season, and then dies.

Artificial insemination: The process of collecting sperm cells from a male animal and manually depositing them into the reproductive tract of a female.

Biennial: Plant which requires two growing seasons to complete its life cycle.

Biltmore stick: Measuring tool used to determine diameter and height of trees.

Bovine: An animal of the cattle group, including buffalo and bison; of or related to such animals.

Brazing: Making an adhesion connection using a minimum amount of an alloy that melts above 840°F (450°C); the alloy flows by capillary action between close-fitting parts.

Career and Technical Student Organization (CTSO): A co-curricular group for students in CTE pathways which encourages them to further their knowledge and skills by participating in activities, events, and competitions.

Career Development Event (CDE): Competitive event for FFA members to improve and display their skills.

Casement: Frame of wood or metal enclosing part (or all) of a window sash. May be opened by means of hinges affixed to the vertical edges.

Chassis: The load-bearing base frame of a vehicle or other wheeled equipment.

Circuit breaker: A switch-like device located inside the electrical breaker panel or circuit breaker box which is designed to limit the amount of power flowing through a circuit and shut off the power to portions or all of the building.

Clinometer: A tool used to measure the angle of elevation, or angle from the ground, in a right triangle to determine height of tall objects such as trees or buildings.

Commodities: Raw materials or primary agricultural products that can be bought and sold.

Compass: An instrument containing a magnetized pointer which shows the direction of magnetic north and bearings from it; an instrument for drawing circles and arcs and measuring distances between points, consisting of two arms linked by a movable joint, one arm ending in a point and the other usually carrying a pencil or pen.

Composting: The biological decomposition of organic waste such as food or plant material by bacteria, fungi, worms, and other organisms under controlled aerobic conditions to create organic matter called humus.

Computer numerical control (CNC): A method of controlling the movement of machine tools by instructions stored on microprocessors.

Conduit: A tube, channel, or pipe in which insulated conductors are contained.

Cross breeding: Producing an animal or plant by mating or hybridizing two different species, breeds, or varieties.

Cutting: Piece of a plant that is used in horticulture for vegetative propagation by placing it in a suitable growing medium such as moist soil.

Diameter tape: Measuring tape used to estimate the diameter of a tree or other cylindrical object, using measurements reduced by the value of π .

Die: A type of tool used to shape or cut metal.

Direct current (DC): Electric current that flows only in one direction.

Draftsman: A person who makes detailed technical plans or drawings.

Drivetrain: The group of components, excluding the engine or motor, that delivers power to the driving wheels of a motorized vehicle.

Electrical metallic tubing (EMT): An unthreaded steel conduit of circular cross section used to route and protect electrical wiring in a structure. Also commonly called thinwall.

Electrode: Terminal point to which electricity is brought in the welding operation and from which the arc is produced to do the welding. In most electric arc welding, the electrode is melted and becomes a part of the weld.

Electronic Control System (ECS): A controller, programmable logic controller (PLC), or processor that controls the automatic electrical and hydraulic functions and safety systems of a machine and captures important machine data.

Environmental Protection Agency (EPA): An independent agency of the United States government which regulates the manufacturing, processing, distribution, and use of chemicals and other pollutants to protect human and environmental health.

Equine: Animals of the horse family including horses, donkeys, and zebras; of or related to such animals.

Fabrication: The action or process of manufacturing or inventing something.

Fastener: A hardware device that mechanically joins two or more objects, generally used to create non-permanent joints that can be removed or dismantled without damaging the joined components.

Felt: Tar paper installed under roof shingles.

Ferrous metal: Iron and its alloys.

FFA: The National FFA Organization, an intra-curricular student organization for those interested in agriculture and leadership; one of the three components of agricultural education.

Fillet weld: Metal fused into a corner formed by two pieces of metal whose welded surfaces are approximately 90° to each other.

Flux cored arc welding (FCAW): Welding method in which heat is supplied by an arc between a hollow, flux-filled electrode and the base metal.

Foreman: A worker who supervises and directs other workers

Framing: Lumber used for the structural members of a building, such as studs, joists, and rafters.

Fusion welding: Any type of welding that uses fusion as part of the process.

Gable: The upper, triangular area on the end of a building, beneath the roof.

Gambrel: A type of two-sided roof characterized by vertical gable ends and two slopes on each side.

Geographic Information System (GIS): A computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface

Global Positioning System (GPS): A global navigation satellite system that uses at least 24 satellites, a receiver, and algorithms to provide location, velocity, and time synchronization for air, sea, and land travel.

Grade: The designated quality of a manufactured piece of wood.

Ground Fault Circuit Interrupter (GFCI): A device that senses when an undesired path exists between a power source and a grounded surface and immediately interrupts the flow of electricity to protect the operator from shock.

Hardwood: A tree that is broad-leaved and deciduous (loses its leaves annually); the wood from such a tree.

Header: A beam placed perpendicular to joists and to which joists are nailed in framing for a chimney, stairway, or other opening; a wood lintel; the horizontal structural member over an opening such as a door or window.

Hip: A roof with four sloping sides; the external angle formed by the meeting of two sloping sides of a roof.

Impoundment: A body of water confined with an enclosure, such as a reservoir or a pond.

Inertia brake control: A mechanism which senses how quickly a tow vehicle is stopping and applies the same amount of braking power to its trailer. It is then activated by a pendulum circuit that senses the vehicle's stopping motion and applies a proportional voltage to the trailer's brakes.

Intra-curricular: Within an educational curriculum.

Joists: Wooden 2x8's, 2x10's, or 2x12's that run parallel to one another and support a floor or ceiling, and are supported in turn by larger beams, girders, or bearing walls.

Knot: The portion of a branch or limb of a tree that appears on the edge or face of the piece of lumber.

Leadership Development Event (LDE): Competitive FFA event designed to enhance students' leadership skills.

Legume: A plant that can readily fixate available nitrogen into a usable form.

Lockout/tagout: A safety procedure used in industry and research settings to ensure that dangerous machines are properly shut off and not able to be started up again prior to the completion of maintenance or repair work.

Macronutrients: Nutrients plants need in larger quantities.

Masonry: Stone, brick, concrete, hollow-tile, concrete block, or other similar building units or materials, normally bonded together with mortar to form walls.

Material Safety Data Sheet (MSDS): Document that contains information on the potential health, fire, reactivity, or environmental hazards of a chemical or other material and explains how to work with safely.

Metal inert gas (MIG): Arc welding using a continuously fed consumable electrode and a shielding gas.

Microchipping: Implanting a small radio-frequency identification (RFID) transponder called a microchip under a pet's skin to provide identification for the pet when its number is read by a scanner.

Micronutrients: Nutrients plants need in lesser quantities.

National Agricultural Statistics Service (NASS): The statistical branch of the U.S. Department of Agriculture.

National Electrical Code (NEC): A set of standards for the installation of electrical wiring and equipment, which many communities include in their building codes.

Nonferrous metal: A metal or alloy that contains no iron.

Nutrient: A substance that provides nourishment essential for growth and the maintenance of life.

Ohm's Law: Electrical principle stating that the current passing through a conductor under constant temperature conditions is proportional to the potential difference across the conductor.

Overlap: Extension of the weld face metal beyond the toe of the weld.

Oxyfuel gas cutting: Cutting metal using an oxygen jet and a preheating flame that combines oxygen and a fuel gas.

Oxyfuel gas welding: Method of welding that combines and burns oxygen and a fuel gas to create the required heat.

Perennials: Plants that live more than two years.

pH (potential of Hydrogen): A measure of acidity or alkalinity of water soluble substances or of water in soil.

Pier: A column of masonry, usually rectangular in horizontal cross section, used to support other structural members.

Plasma arc cutting: A metal cutting process that uses an electric arc and fast flowing ionized gases.

Pneumatic systems: Equipment or machinery whose source of power is compressed air.

Polarity: The direction of flow of electrons in a closed, direct current welding circuit.

Pollination: The process by which plant pollen is transferred from the male reproductive organs to the female reproductive organs to form seeds.

Polyvinyl chloride (PVC) or chlorinated polyvinyl chloride (CPVC) pipe: Types of white or light gray plastic pipe used for water supply lines and waste pipe.

Ratite: Any of the mostly large, flightless birds, such as emus or ostriches.

Reinforcement: The strengthening structure or material employed in reinforced concrete or plastic.

Resistance-value (R-value): A measure of a material's resistance to the passage of heat, used to rate the effectiveness of insulation.

Riser: Each of the vertical boards closing the spaces between the treads of stairways.

Selective breeding: The process by which humans use animal or plant breeding techniques to selectively develop particular traits.

Setback lines: The distance from a curb, property line, or structure within which building is prohibited.

Shielded metal arc welding (SMAW): Arc welding process that melts and fuses metals using the heat of an arc between a covered electrode and the base metal; as it melts, the electrode also provides the filler metal.

Shingle: Roof covering of asphalt, asbestos, wood, tile, slate, or other material cut to stock lengths, widths, and thicknesses and installed one at a time on a structure.

Sill: The 2x4 or 2x6 wood plate framing member that lies flat against and bolted to the foundation wall (with anchor bolts) and upon which the floor joists are installed; the structural member forming the lower side of an opening, as a door sill or window sill.

Silviculture: The growing and cultivation of trees.

Simulated workplace: An educational setting which establishes workplace conditions and requirements within the classroom or laboratory.

Softwood: A tree that is coniferous (cone-bearing) and has needlelike leaves; the wood from such a tree.

Soleplate: Bottom horizontal member of a frame wall.

Split: A separation or crack in wood which extends through the piece to the opposite surface or to an adjoining surface due to the tearing apart of the wood cells.

Staking: Supporting a tree or plant with a stake or stakes.

Stringer bead: Narrow weld bead made without oscillating the weld pool.

Stud: A vertical wood framing member, also referred to as a wall stud, attached to the horizontal sole plate below and the top plate above; one of a series of wood or metal vertical structural members placed as supporting elements in walls and partitions.

Supervised Agricultural Experience (SAE): A planned, practical activity that helps students gain skills, competencies, and experience in a career area of the student's choice as part of agriscience education. SAE types include placement, research, and entrepreneurship.

Sweating: Heating the end of a copper pipe, adding solder to produce a leak-free union.

Swine: Pig.

Tagging (livestock): The process of inserting a small plastic or metal object with an applicator that pierces the ear of livestock or other animals. Around the farm, they are visual aids that use numbers, colors, or a combination of both, for organizational purposes.

Tap: A tool used to cut threads in a hole; an intermediate point in an electrical circuit at which an electrical connection can be made.

Talent Development Event (TDE): An FFA competition in which students showcase their musical talent through string bands, quartets, and other talent events.

Tensile strength: Maximum pull stress, in pounds per square inch or megapascals (newtons per square millimeter), that a specimen will withstand.

Three-circle model: The model that describes a successful agriscience program as having equal parts of classroom lab, FFA, and SAE.

Timber Stand Improvement (TSI): Practices designed to produce more and better quality wood products by improving the quality and species of the stand and by increasing the rate of growth of the residual or crop trees in the stand.

Tread: The walking surface board in a stairway.

Truss: A framework, typically consisting of rafters, posts, and struts, supporting a roof, bridge, or other structure.

Tungsten inert gas (TIG): Arc welding using a tungsten electrode and a shielding gas, with the filler metal added using a welding rod.

Valley: Area of a roof where two slopes meet.

Voltage meter: Meter used to measure volts.

Wane: A defect in a plank or board characterized by bark or insufficient wood at a corner or along an edge, due to the curvature of the log.

Warp: Any variation of shape in lumber from a true surface or edge. Types of warp include cup, bow, wind (twist), and crook.

Weave bead: A wide weld bead that is formed by moving the torch or electrode from side-to-side as the weld pass progresses along the weld joint.