2025 Meat Science and Muscle Biology

Program CIP: 01.0401 – Agricultural and Food Products Processing

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The Research and Curriculum Unit (RCU), located in Starkville, as part of Mississippi State University (MSU), was established to foster educational enhancements and innovations. In keeping with the land-grant mission of MSU, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances the intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

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Acknowledgments

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Dr. Lance Evans, State Superintendent of Education, Executive Secretary
Mr. Glen East, Chair
Mr. Matt Miller, Vice-Chair
Dr. Ronnie McGehee
Mr. Bill Jacobs
Mr. Mike Pruitt
Ms. Mary Werner
Dr. Wendi Barrett
Ms. Billye Jean Stroud
Mr. Matt Mayo
Ms. Kate Riddle, Student Representative
Mr. Crosby Parker, Student Representative

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Dr. Derris Devost Burnett, Associate Professor of Meat Science and Muscle Biology, Mississippi State University
Dr. Xue Zhang, Assistant Research Professor in Food Science and Technology, Mississippi State University

Standards

Standards and alignment crosswalks are referenced in the appendices. Depending on the curriculum, these crosswalks should identify alignment to the standards mentioned below, as well as possible related academic topics as required in the Subject Area Testing Program in Algebra I, Biology I, English II, and U.S. History from 1877, which could be integrated into the content of the units. Mississippi's CTE Meat Science and Muscle Biology is aligned to the following standards:

National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards
The National Council on Agricultural Education developed the National AFNR Career Cluster Content Standards to guide what students should know or be able to do through a study of agriculture in Grades 9-12 and two-year postsecondary programs. The standards were extensively researched and reviewed by leaders in the agricultural industry, secondary and postsecondary instructors, and university specialists. The standards consist of a pathway content standard for each of the eight career pathways. Performance elements representing major topic areas with accompanying performance indicators were developed for each content standard. Measurements of assessment of the performance elements and performance indicators were developed at the basic, intermediate, and advanced levels. The National AFNR Career Cluster Content Standards are copyrighted by the National Council for Agricultural Education and used with permission.
thecouncil.ffa.org/afnr

International Society for Technology in Education Standards (ISTE)
Reprinted with permission from *ISTE Standards for Students* (2016). All rights reserved. Permission does not constitute an endorsement by ISTE (iste.org).

College- and Career-Readiness Standards
College- and career-readiness standards emphasize critical thinking, teamwork, and problem-solving skills. Students will learn the skills and abilities demanded by the workforce of today and the future. Mississippi adopted Mississippi College- and Career-Readiness Standards (MCCRS) to provide a consistent, clear understanding of what students are expected to learn and so teachers and parents know what they need to do to help them.
mdek12.org/oae/college-and-career-readiness-standards

Framework for 21st Century Learning
In defining 21st-century learning, the Partnership for 21st Century Skills has embraced key themes and skill areas that represent the essential knowledge for the 21st century: global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; environmental literacy; learning and innovation skills; information, media, and technology skills; and life and career skills.
battelleforkids.org/networks/p21/frameworks-resources

Preface

Secondary CTE programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing applied learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments. This document provides information, tools, and solutions that will aid students, teachers, and schools in creating and implementing applied, interactive, and innovative lessons. Through best practices, alignment with national standards and certifications, community partnerships, and a hands-on, student-centered concept, educators will be able to truly engage students in meaningful and collaborative learning opportunities.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, *Mississippi Code of 1972*, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, Ch. 487, §14; Laws, 1991, Ch. 423, §1; Laws, 1992, Ch. 519, §4 eff. from and after July 1, 1992; Strengthening Career and Technical Education for the 21st Century Act, 2019 [Perkins V]; and Every Student Succeeds Act, 2015).

Mississippi Teacher Professional Resources

The following are resources for Mississippi teachers:

Curriculum, Assessment, Professional Learning

Program resources can be found at the RCU's website, rcu.msstate.edu.

Learning Management System: An Online Resource

Learning management system information can be found at the RCU's website, under Professional Learning.

Should you need additional instructions, contact the RCU at 662.325.2510 or helpdesk@rcu.msstate.edu.

Executive Summary

Pathway Description
Meat Science and Muscle Biology is a pathway in the Agriculture Career Cluster. Meat Science and Muscle Biology is a comprehensive journey into the realm of meat cutting, packing, and processing. This series of courses is crafted to prepare individuals for careers or further education in the meat industry, covering fundamental and advanced topics essential for success in this field. Beginning with Meat Science and Muscle Biology: Fundamentals, students transition into crucial aspects such as orientation to meat processing, safety protocols, sanitation standards, equipment handling, and facility maintenance. This foundational course also integrates basic Supervised Agricultural Experience (SAE) construction activities, providing a practical framework for ongoing learning within the program.

Advancing through the pathway, students explore specialized areas in meat processing with courses like Meat Science and Muscle Biology: Custom Operations, which cover topics such as custom livestock slaughter, pricing strategies, and marketing techniques. Continuing the journey, Meat Science and Muscle Biology: Basic and Advanced Meats Processing courses offer in-depth knowledge on the identification and fabrication of various meats, including beef, pork, lamb, goat, poultry, fish, and wild game. Students gain hands-on experience in automated processing methods, quality grading, curing, smoking, and sausage making, culminating in a comprehensive SAE/Embedded Work-based Learning (WBL) project. This pathway equips learners with the expertise and practical skills needed to excel in the diverse and rewarding career opportunities within the thriving meat industry, setting them on a path toward success and innovation.

College, Career, and Certifications
No national industry-recognized certifications are known to exist at this time in the field of agriculture and natural resources. Competencies and suggested objectives in this course have been correlated, however, to the National AFNR Career Cluster Content Standards that have been reviewed and endorsed at the national level by the National Council on Agricultural Education.

Grade Level and Class Size Recommendations
It is recommended that students enter this program as freshmen, sophomores, or juniors. Exceptions to this are district-level decisions based on class size, enrollment numbers, student maturity, and CTE delivery method. This is a hands-on, lab- or shop-based course. Therefore, a maximum of 15 students is recommended per class with only one class with the teacher at a time.

Student Prerequisites
For students to experience success in the program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in high school-level math (last course taken or the instructor can specify the level of math instruction needed)
3. Instructor approval and Test of Adult Basic Education (TABE) reading score (eighth grade or higher)

or

1. TABE reading and math score (eighth grade or higher)
2. Instructor approval

or

1. Instructor approval

Assessment

The latest assessment blueprint for the curriculum can be found at rcu.msstate.edu/curriculum/curriculum.

Applied Academic Credit

The latest academic credit information can be found at mdek12.org/ese/approved-course-for-the-secondary-schools.

Teacher Licensure

The latest teacher licensure information can be found at mdek12.org/oel/apply-for-an-educator-license.

Professional Learning

If you have specific questions about the content of any training sessions provided, please contact the RCU at 662.325.2510 or helpdesk@rcu.msstate.edu.

Course Outlines

Option 1—Four 1-Carnegie Unit Courses

This curriculum consists of four 1-credit courses that should be completed in the following sequence:

1. **Meat Science and Muscle Biology: Fundamentals—Course Code: 991202**
2. **Meat Science and Muscle Biology: Custom Operations—Course Code: 991203**
3. **Meat Science and Muscle Biology: Basic Meats Processing—Course Code: 991204**
4. **Meat Science and Muscle Biology: Advanced Meats Processing—Course Code: 991205**

Course Description: Meat Science and Muscle Biology: Fundamentals
Meat Science and Muscle Biology: Fundamentals is a course that prepares individuals for employment or continued education in the meat cutting, packing, and processing professions. Topics include orientation to meat processing, safety, sanitation, equipment, and facility maintenance. The course also incorporates basic SAE construction that will be ongoing throughout the agricultural program.

Course Description: Meat Science and Muscle Biology: Custom Operations
Meat Science and Muscle Biology: Custom Operations is a course that allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include custom livestock slaughter, pricing, wrapping, and marketing.

Course Description: Meat Science and Muscle Biology: Basic Meats Processing
Meat Science and Muscle Biology: Basic Meats Processing is a course that prepares individuals for employment or continued education in the meat cutting, packing, and processing professions. Topics include the identification and fabrication of carcass beef, box pork, carcass lamb, and goat.

Course Description: Meat Science and Muscle Biology: Advanced Meats Processing
Meat Science and Muscle Biology: Advanced Meats Processing is a course that allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include identification and fabrication of poultry and fish wild game, automated processing of meat quality and yield grading, curing, smoking, and sausage making. The course concludes with a comprehensive SAE project expected for all students in agricultural classes.

Food Products (Meats): Fundamentals—Course Code: 991202

Unit	Unit Title	Hours
1	Orientation to Meat Science and Muscle Biology	40
2	The National FFA Organization and Career Development	20
3	Safety, Sanitation, Equipment, and Facility Maintenance	80
Total		**140**

Food Products (Meats): Custom Operations—Course Code: 991203

Unit	Unit Title	Hours
4	Principles of Livestock Slaughter	45
5	Pricing, Packaging, and Retail Marketing	45
6	Special Topics in Meat Science and Muscle Biology	50
Total		**140**

Food Products (Meats): Basic Meats Processing—Course Code: 991204

Unit	Unit Title	Hours
7	Meat Science and Muscle Biology Careers and FFA Leadership	20
8	Identification and Fabrication of Carcass and Box Beef	50
9	Identification and Fabrication of Carcass and Box Pork	45
10	Identification and Fabrication of Carcass Lamb and Goat	25
Total		**140**

Food Products (Meats): Advanced Meats Processing—Course Code: 991205

Unit	Unit Title	Hours
11	Identification and Fabrication of Poultry and Fish	20
12	Identification and Fabrication of Wild Game	25
13	Automation of the Modern Meat Industry	15
14	Quality and Yield Grading	20
15	Curing, Smoking, and Sausage Making	20
16	Special Topics in Meat Science and Muscle Biology II	15
17	Immersion into FFA and Supervised Agriculture Experience (SAE) for All	25
Total		**140**

Option 2—Two 2-Carnegie Unit Courses

This curriculum consists of two 2-credit courses that should be completed in the following sequence:

1. **Meat Science and Muscle Biology I—Course Code: 991200**
2. **Meat Science and Muscle Biology II—Course Code: 991201**

Course Description: Meat Science and Muscle Biology I
Meat Science and Muscle Biology I is a comprehensive course designed to equip students with the essential knowledge and skills for careers or further education in the meat cutting, packing, and processing industries. Throughout this course, students will delve into fundamental topics such as orientation to meat processing, safety protocols, sanitation standards, equipment handling, and facility maintenance. Additionally, students will engage in basic Supervised Agricultural Experience (SAE) construction activities, laying the foundation for ongoing learning and development within the agricultural program. This course provides a framework for understanding meat science and muscle biology, preparing students for success in the agricultural industry.

Course Description: Meat Science and Muscle Biology II
Meat Science and Muscle Biology II is the final course in the program, offering advanced training for individuals pursuing careers or further education in the meat cutting, packing, and processing fields. Building upon the foundational knowledge gained in previous course, this comprehensive program includes both basic and advanced meat processing techniques. Students will explore topics such as the identification and fabrication of carcass beef, box pork, carcass lamb, and goat, as well as poultry, fish, and wild game. Additionally, the course covers automated processing of meats, quality, and yield grading, curing, smoking, and sausage making. As a final component, students will engage in a comprehensive Supervised Agricultural Experience (SAE) project, providing hands-on experience and real-world application of the skills learned throughout the program. This course ensures that students are well-equipped with the practical experience needed to excel in the meat industry.

Meat Science and Muscle Biology I—Course Code: 991200

Unit	Unit Title	Hours
1	Orientation to Meat Science and Muscle Biology	40
2	The National FFA Organization and Career Development	20
3	Safety, Sanitation, Equipment, and Facility Maintenance	80
4	Principles of Livestock Slaughter	45
5	Packaging, Marketing, and Retail Sales	45
6	Special Topics in Meat Science and Muscle Biology	50
Total		**280**

Meat Science and Muscle Biology II—Course Code: 991201

Unit	Unit Title	Hours
7	Meat Science and Muscle Biology Careers and FFA Leadership	20
8	Identification and Fabrication of Carcass and Box Beef	50
9	Identification and Fabrication of Carcass and Box Pork	45
10	Identification and Fabrication of Carcass Lamb and Goat	25
11	Identification and Fabrication of Poultry and Fish	20
12	Identification and Fabrication of Wild Game	25
13	Automation of the Modern Meat Industry	15
14	Quality and Yield Grading	20
15	Curing, Smoking, and Sausage Making	20
16	Special Topics in Meat Science and Muscle Biology II	15
17	Immersion into FFA and Supervised Agriculture Experience (SAE) for All	25
Total		**280**

Career Pathway Outlook

Overview

The Meat Science and Muscle Biology pathway curriculum offers students a comprehensive journey into the world of meat cutting, packing, and processing. Beginning with Meat Science and Muscle Biology I, students learn foundational topics like safety procedures, sanitation standards, and equipment handling, while also engaging in basic Supervised Agricultural Experience (SAE) activities. Within Meat Science and Muscle Biology II, students deepen their understanding with specialized instruction in meat processing techniques, including identifying and fabricating various meats, automated processing methods, and quality grading. This curriculum prepares students for various occupations involving food science and meat processing, from researching ways to improve the efficiency and safety of food production to cutting, trimming, and packaging meat for retail sales. Occupations in this field range from working as butchers and meat cutters in grocery stores to positions as food scientists and technologists in laboratories, offices, and the field. While training for simple meat cutting may take only a few weeks, more complicated cutting tasks generally require training that may last from several months to more than a year. Food scientists typically need at least a bachelor's degree, although many pursue advanced degrees, while food science technicians typically require an associate degree in biology, chemistry, crop or animal science, or a related field. The Meat Science and Muscle Biology pathway equips students with the practical skills and knowledge needed to excel in these diverse and rewarding career opportunities within the meat industry.

Needs of the Future Workforce

In relation to meat science and muscle biology, food scientists and technologists in Mississippi's northeast nonmetropolitan area benefit from some of the highest employment rates, according to the U.S. Bureau of Labor and Statistics. The employment in this area of the state accounts for a little less than 2.5 times the national average employment rate. The hourly mean wage for these jobs is $43.69 with an annual mean wage of $90,880. Occupations related to food science and technology are some of the top-paying occupations in the nonmetropolitan, northeast portion of Mississippi. Nationally, from 2022-2032, food scientists and technologists should see an increase of 1,200 jobs, which accounts for a 7% growth rate overall. The patterns of job growth shown in Table 1.1 relate to a range of meat science and muscle biology occupations.

Table 1.1: Current and Projected Occupation Report

Description	Jobs, 2020	Projected Jobs, 2030	Change (Number)	Change (Percent)	Average Hourly Earnings, 2024
Agricultural and Food Science Technicians	210	240	30	14.3%	$24.29
Biological Technicians	390	400	10	2.6%	$24.74
Chemical Technicians	480	480	0	0%	$24.78
Compliance Officers	2,180	2,320	140	6.4%	$31.43
Environmental Science and Protection Technicians, Including Health	100	100	0	0%	$22.50

Environmental Scientists and Specialists, Including Health	290	290	0	0%	$35.16
Farm Equipment Mechanics and Service Technicians	670	700	30	4.5%	$21.43
First-Line Supervisors of Production and Operating Workers	6,760	7,020	260	3.8%	$33.36
Food Batchmakers	540	690	150	27.8%	$15.25
Food Cooking Machine Operators and Tenders	130	160	30	23.1%	$17.32
Food Processing Workers, All Other	320	390	70	21.9%	$17.58
Food Service Managers	2,820	3,500	680	24.1%	$27.15
Industrial Machinery Mechanics	5,110	5,450	340	6.7%	$27.69
Industrial Production Managers	1,760	1,840	80	4.5%	$57.65
Meat, Poultry, and Fish Cutters and Trimmers	7,070	9,340	2270	32.1%	$15.77
Microbiologists	30	40	10	33.3%	$47.37
Nonfarm Animal Caretakers	2,210	2,560	350	15.8%	$12.10
Occupational Health and Safety Specialists	710	760	50	7%	$33.68
Occupational Health and Safety Technicians	220	240	20	9.1%	$33.24
Packaging and Filling Machine Operators and Tenders	3,040	3,300	260	8.6%	$16.39
Purchasing Managers	400	430	30	7.5%	$49.62
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	8,560	9,040	480	5.6%	$33.43
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	470	500	30	6.4%	$41.44
Slaughterers and Meat Packers	990	1,310	320	32.3%	$16.61

Veterinary Technologists and Technicians	400	460	60	15%	$16.34
Zoologists and Wildlife Biologists	450	500	50	11.1%	$48.78

Source: Mississippi Department of Employment Security; mdes.ms.gov (2024).

Perkins V Requirements and Academic Infusion

The Meat Science and Muscle Biology curriculum meets Perkins V requirements of introducing students to and preparing them for high-skill, high-wage occupations in agricultural fields. It also offers students a program of study, including secondary, postsecondary, and institutions of higher learning courses, that will further prepare them for agriculture careers. Additionally, this curriculum is integrated with academic college- and career-readiness standards. Lastly, it focuses on ongoing and meaningful professional development for teachers as well as relationships with industry.

Transition to Postsecondary Education

The latest articulation information for secondary to postsecondary can be found at the Mississippi Community College Board website, mccb.edu.

Best Practices

Innovative Instructional Technologies

Classrooms should be equipped with tools that will teach today's digital learners through applicable and modern practices. The Meat Science and Muscle Biology educator's goal should be to include teaching strategies that incorporate current technology. To make use of the latest online communication tools—wikis, blogs, podcasts, and social media platforms, for example—the classroom teacher is encouraged to use a learning management system that introduces students to education in an online environment and places more of the responsibility of learning on the student.

Differentiated Instruction

Students learn in a variety of ways, and numerous factors—students' background, emotional health, and circumstances, for example—create unique learners. By providing various teaching and assessment strategies, students with various learning preferences can have more opportunities to succeed.

CTE Student Organizations

Teachers should investigate opportunities to sponsor a student organization. The National FFA Organization is an example of a student organization with many outlets for agriculture. Student organizations provide participants and members with growth opportunities and competitive events. They also open the doors to the world of agriculture careers and scholarship opportunities.

Cooperative Learning

Cooperative learning can help students understand topics when independent learning cannot. Therefore, you will see several opportunities in the Meat Science and Muscle Biology curriculum for group work. To function in today's workforce, students need to be able to work collaboratively with others and solve problems without excessive conflict. The Meat Science and Muscle Biology curriculum provides opportunities for students to work together and help each other complete complex tasks. There are many field experiences within the Meat Science and Muscle Biology curriculum that will allow and encourage collaboration with professionals currently in the Meat Science and Muscle Biology field.

Work-Based Learning

Work-based learning is an extension of understanding competencies taught in the Meat Science and Muscle Biology classroom. The Meat Science and Muscle Biology program requires students to obtain a minimum of 35 clinical-type hours, which may include but is not limited to, clinicals or worksite field experiences, entrepreneurships, internships, pre-apprenticeships, school-based enterprises, job placements, and simulated worksites. These real-world connections and applications provide a link to all types of students regarding knowledge, skills, and professional dispositions. Thus, supervised collaboration and immersion into the agriculture industry are keys to students' success, knowledge, and skills development. For more information on embedded WBL, visit the Mississippi Work-Based Learning Manual on the RCU website, rcu.msstate.edu.

Professional Organizations

American Association for Agricultural Education (AAAE)
aaaeonline.org

Association for Career and Technical Education (ACTE)
acteonline.org

Mississippi Association of Agricultural Educators (MSAAE)
mississippiffa.org

Mississippi ACTE (MS ACTE)
mississippiacte.com

National Association of Agricultural Educators (NAAE)
naae.org

National FFA Organization
ffa.org

Using This Document

Competencies and Suggested Objectives
A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies. The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.

Teacher Resources
All teachers should request to be added to the Canvas Resource Guide for their course. For questions or to be added to the guide, send a Help Desk ticket to the RCU by emailing helpdesk@rcu.msstate.edu.

Perkins V Quality Indicators and Enrichment Material
Some of the units may include an enrichment section at the end. This material will greatly enhance the learning experiences of students. If the Meat Science and Muscle Biology program is using a national certification, work-based learning, or another measure of accountability that aligns with Perkins V as a quality indicator, this material could very well be assessed on that quality indicator. It is the responsibility of the teacher to ensure all competencies for the selected quality indicator are covered throughout the year.

Unit 1: Orientation to Meat Science and Muscle Biology

Competencies and Suggested Objectives
1. Explain the science and trends in slaughtering and processing. DOK 1 a. Explore the science of slaughtering and processing. • Humane harvest • Hazard Analysis Critical Control Point (HACCP) • Species differences b. Explore industry trends in slaughtering and processing. • Automation and robotics • Small and medium size processors • Value-added products (e.g., jerky, summer sausage, bacon, new dietary products)
2. Describe factors affecting consumption and industry patterns. DOK 2 a. Investigate factors affecting consumer food spending, including income, geographic area, ethnic groups, and religious groups. b. Investigate factors affecting industry patterns, including food health awareness, income, geographic area, ethnic groups, and religious groups
3. Investigate the processing of wildlife and other geographic or culturally relevant meat practices. DOK3 a. Analyze chronic wasting disease (CWD) and its effects on consumer spending. b. Analyze wild hogs and zoonotic diseases.

Enrichment
Business Revitalization Plan An outdated retail meat market has been purchased, and the goal is to make the enterprise/business successful. For the enrichment activity, students will research current trends and technologies in the retail meat market and develop a business revitalization plan. This plan will include a summary of consumer preferences, recommendations for modern equipment and sustainable practices, and marketing strategies to enhance the market's appeal. Students will present their findings and proposals in a concise presentation, demonstrating their understanding of how to make the business successful.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 2: The National FFA Organization and Career Development

Competencies and Suggested Objectives

1. Explore the integral relationship between FFA and agricultural education. DOK 2
   a. Discuss and be able to explain historical events that shaped school-based agricultural education.
      - Smith-Hughes Act (1917)
      - Establishment of the Future Farmers of America (FFA) (1928)
      - Mississippi FFA Association chartered (1934)
      - Establishment of New Farmers of America (NFA) (1935)
      - Public Law 740 (1950)
      - Merger of the FFA and NFA (1965)
      - Female membership (1969)
      - FFA changes its name to the National FFA Organization (1988)
   b. Identify types of FFA membership.
      - Active
      - Collegiate
      - Alumni
      - Honorary
   c. Distinguish among the degree levels of FFA membership and describe the requirements for each:
      - Discovery FFA degree
      - Greenhand FFA degree
      - Chapter FFA degree
      - State FFA degree
      - American FFA degree

2. Explore the role of the FFA in promoting leadership, personal growth, and career success through 21st-century skills standards. DOK2
   a. Explain the role of effective leadership.
   b. Self-evaluate personal leadership traits and develop a plan for improvement.
   c. Identify and put into practice FFA activities that promote personal and career development, teamwork, and leadership skills.
      - Public speaking and communication skills
      - Career development events (CDEs) and leadership development events (LDEs)
      - Proficiency awards
      - Community service activities
      - Conventions and leadership conferences
   d. Demonstrate basic parliamentary procedure.
      - Conducting a meeting
      - Stating a main motion
      - Discussing the main motion
      - Voting on a motion

- Understanding the use of the gavel

e. Distinguish between types of motions:
   - Main
   - Subsidiary
   - Incidental
   - Privileged

3. Describe the role of 21st-century skills, work ethic, and values in establishing and building a successful career. DOK3
   a. Define and describe universally accepted work ethics and values as applied to agricultural, food, and natural resources careers.
      - Trustworthiness
      - Respect
      - Responsibility
      - Fairness
      - Citizenship
   b. Identify career-related values and ethics promoted through FFA activities.
      - Attendance
      - Attitude
      - Achievement
      - Relationship building
      - Vision
      - Character
      - Awareness
      - Continuous improvement
      - Personal growth
      - Time management
      - Communication
      - Decision-making
      - Flexibility and adaptability
   c. Practice work ethic and values in:
      - Food Products classroom and laboratory
      - student organization activities
      - experiential learning
      - work-based learning.
4. Develop a foundational SAE and maintain digital records in the state-approved record-keeping system. DOK4

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.

Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 3: Safety, Sanitation, Equipment, and Facility Maintenance

Competencies and Suggested Objectives
1. Explain general meat laboratory safety requirements. DOK 2 List and practice safety rules and procedures. a. Examine and sign a Good Manufacturing Practice (GMP) contract.
2. Discuss sanitation as it applies to a meat processing facility. DOK 3 a. Describe the sanitary operation of a meat processing facility. b. Describe and demonstrate proper donning, doffing, and sanitation of personal protective equipment (PPE) while in the laboratory setting. • Aprons • Disposable gloves • Cut gloves • Hard hats • Eye protection • Hair/beard nets • Rubber boots c. Explain state and federal inspection guidelines as they apply to meat processing facilities, including ways to avoid fecal contamination. d. Identify correct temperatures for meat processing and storage and explain the importance of each. e. Describe the benefits of a rail system.
3. Investigate federal regulations related to meat processing. DOK 2 a. Discuss SSOP (Sanitation Standard Operating Procedures) and HACCP as a method to prevent foodborne illness. b. Discuss the role of the United States Department of Agriculture (USDA) Food Safety and Inspection Service related to quality assurance.
4. Identify and safely use equipment for meat cutting, packing, and processing. DOK 2 a. Identify equipment used in a meat laboratory, including a band saw, grinder, mixer, tenderizer, slicing machine, and stuffer. b. Safely assemble and disassemble equipment, including band saw, grinder, mixer, tenderizer, slicing machine, and stuffer. c. Identify, safely use, and sanitize other meat processing equipment, including knives, knife sharpeners, steel and hone, stockinette, deadlock and tag, scales and weighing items, vacuum packers, salinometers, squeegee equipment, patty machine, heat seal, coolers, freezers, rail systems, tables, hoists, skinning knives, and carcass split saws. d. Practice sterilization for knives and steel.
5. Demonstrate equipment maintenance used in a meat processing facility. DOK 2 a. Maintain a sharp knife, including boning and butcher knives. b. Perform equipment and maintenance procedures for a grinder, slicer, and band saw. c. Use proper disinfection procedures for cleaning tables after use. d. Demonstrate proper hand washing procedures before and after working in the meat processing laboratory.

6. Maintain a safe and sanitary facility. DOK 2
    a. Wash and disinfect walls and floors.
    b. Maintain a safe environment by wiping up spills, keeping aisles clear, and performing other tasks.

Enrichment

Safety and Sanitation Scenario

As the new owner of a meat market, a safety inspection reveals the absence of safety and sanitation plans, leading to disapproval from inspectors. To address this, students will develop a Sanitation Standard Operating Procedure (SSOP) and/or a Hazard Analysis Critical Control Point (HACCP) plan to ensure the facility is safe and clean, enabling the business to open. This enrichment activity will involve researching industry standards for safety and sanitation, identifying potential hazards, and outlining detailed procedures for maintaining a hygienic environment. The final product will be a comprehensive written report, guided by the teacher resource document's rubric, demonstrating students' ability to create effective safety and sanitation plans essential for regulatory compliance and business success.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.

Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 4: Principles of Livestock Slaughter

Competencies and Suggested Objectives
1. Explain terms and procedures associated with livestock slaughter. DOK1 a. Define terms and procedures associated with the slaughter of beef. b. Define terms and procedures associated with the slaughter of swine. c. Define terms and procedures associated with the slaughter of lamb and goat. d. Define terms and procedures associated with the slaughter of poultry. e. Define terms and procedures associated with the slaughter of fish. f. Define terms and procedures associated with the dressing of wild game. g. Discuss the difference between antemortem and postmortem inspection.
2. Discuss types, cleaning, use, and maintenance of slaughter facilities and equipment. DOK1 a. Identify equipment, including an immobilizer, skinning knives, rails and rail hooks, scales, dehairing machine, hoist, and carcass split saw. b. Discuss pre-operation and post-operation maintenance of a safe and sanitary facility.
3. Demonstrate an understanding of food safety protocols and procedures during food processing. DOK2 a. Identify what constitutes contamination from physical, biological, and chemical sources. b. Identify special considerations for wild game. • CWD and other zoonotic diseases c. Describe methods of disposing of offal. d. Describe the disposal of condemned tissues.

Enrichment
Byproducts Scenario Students will develop a scenario regarding the operation of a beef slaughterhouse, determining which animal byproducts can be sold and identifying their corresponding prices. Additionally, they will research appropriate disposal methods for any unsellable products. The outcome will be a detailed presentation that outlines the potential revenue from byproducts and ensures compliance with disposal regulations. This activity will be guided by the presentation rubric from the teacher resource document, with a measurable outcome of students accurately identifying at least five marketable byproducts and their prices, as well as detailing proper disposal methods for non-marketable items.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 5: Packaging, Marketing, and Retail Sales

Competencies and Suggested Objectives
1. Compare and contrast market prices, consumer trends, supply and demand, and their effects on meat prices. DOK1 a. Discuss supply and demand and its effects on meat prices. b. Identify current consumer trends. c. Explore market prices using agricultural market and service databases or other databases.
2. Investigate the breaking down of muscles from various animals and perform a cutting test if applicable. DOK2 a. Discuss and explore methods of breaking down the muscle of marketable meat. b. Perform a cutting test on available muscles.
3. Discuss packaging techniques and technology advancement for retail meat. DOK2 a. Discuss techniques for wrapping retail meats. b. Discuss packaging and labeling requirements for retail sales. c. Package, weigh, label, and price meat for retail sale. d. Practice packaging and labeling various cuts of meat for home freezing. e. Describe the proper temperatures for maximum storage life of retail meats using a cooler, display case, or freezer.
4. Examine marketing principles related to the display of meat. DOK2 a. Describe marketing principles related to the display of meat. b. Observe the effects of various packaging methods on the shelf life of meat.

Enrichment
Meat Marketing Scenario You are working for a large grocery chain in the advertising department. The chain is planning a big sales event next month, and they expect you to develop the marketing plan for the meat department. Include the current market price, proposed retail price, and calculate the profit over the loss. Discuss which packaging you would use and why. Use the presentation or poster rubric from the teacher resource document for guidance.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 6: Special Topics in Meat Science and Muscle Biology

Competencies and Suggested Objectives
1. Investigate new and emerging technologies, practices, trends, and issues associated with meat science and muscle biology. DOK3 a. Prepare and present a report on a new, emerging technology, current practice, trend or issue associated with meat science and muscle biology.
2. Complete school-to-career activities related to meat science and muscle biology. DOK2 a. Participate in a school-to-career activity (shadowing, mentoring, career fair, etc.) related to meat science and muscle biology. b. Investigate educational opportunities related to meat science and muscle biology at the postsecondary level. c. Describe national standards and certification/licensing procedures related to meat science and muscle biology. d. Describe the role of trade organizations, associations, and unions as related to meat science and muscle biology.
3. Demonstrate related academic skills and workplace skills associated with meat science and muscle biology. DOK2 a. Complete a cooperative project (paper, presentation, or demonstration) associated with an academic subject, aligned to meat science and muscle biology. b. Practice human relations skills (team participation, client/customer service, leadership, negotiation, working with culturally diverse groups, etc.) related to meat science and muscle biology. c. Research work ethics and employer expectations of employees in meat science and muscle biology
4. Investigate the concepts of quality assurance as related to meat science and muscle biology. DOK3 a. Describe quality concepts and methods for measuring quality related to meat science and muscle biology. b. Apply quality concepts in meat science and muscle biology.
5. Examine global economic factors, trends, and changes related to meat science and muscle biology. DOK1 a. Define and discuss the concept of global economics and competition. b. Describe global economic factors and competition as related to meat science and muscle biology. c. Identify regions and other countries that compete in meat science and muscle biology

Enrichment
Beef Trends Scenario: As a food science worker with a major livestock board, students will research and keep up with current beef industry trends. They will develop a presentation for the board on the latest trends, emerging technologies, and available jobs in today's market. The final product will be a

comprehensive presentation that accurately reflects the current state of the beef industry, guided by the presentation rubric from the teacher resource document. A measurable outcome for this activity is that students will successfully identify and explain at least three current trends, two new technologies, and three job opportunities within the beef industry.

Farm-to-Fork Journey of a Retail Meat Cut:
Students will describe the farm-to-fork journey of a retail meat cut, such as a lamb chop, pork chop, or ribeye. This activity will involve researching each stage of the process, from animal rearing and slaughtering to processing, packaging, and retail distribution. The goal is to provide a detailed, step-by-step account of the journey, highlighting key practices and considerations at each stage.

In addition to creating a detailed written report or visual timeline of the farm-to-fork journey, students will develop a comprehensive infographic that illustrates each step in the process. This infographic will be assessed based on accuracy, clarity, and completeness, ensuring that students effectively communicate the entire journey of the selected meat cut from farm to consumer.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.

Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 7: Meat Science and Muscle Biology Careers and FFA Leadership

Competencies and Suggested Objectives
1. Review safety rules and behavior. DOK1 a. Identify safety rules and behavior for the classroom. b. Identify safety rules and behavior for the shop and laboratory areas.
2. Investigate and develop skills necessary for pursuing a career in meat science. DOK2 a. Discover the careers available in meat science. b. Build a personal résumé and cover letter for the purpose of applying for jobs. c. Perform a mock interview utilizing the personal résumé and cover letter.
3. Actively participate in the FFA chapter program of activities (POA). DOK3 a. Identify and participate in FFA activities and programs that contribute to career advancement and individual achievement. b. Select and document FFA activities and programs that contribute to personal development.
4. Develop and present a 3 to 5-minute presentation on a meat science topic. DOK2 a. Discuss guidelines for preparing a successful presentation, including preparation, resource development, writing skills, and presentation skills.
5. Develop an immersion SAE and maintain digital records in the state-approved record-keeping system. DOK4

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 8: Identification and Fabrication of Carcass and Box Beef

Competencies and Suggested Objectives
1. Identify and safely fabricate cuts of beef and discuss market prices. DOK2 a. Identify carcass break cuts of beef. b. Make retail cuts of the following: • Round loin • Rib • Chuck • Foreshank • Brisket • Plate • Flank
2. Identify and safely fabricate variety cuts of beef and discuss market prices. DOK2 a. Make retail cuts of the following: • Tongue • Heart • Liver • Kidney • Tripe

Enrichment
Retail Cuts Poster (could be used with other units as well) Students will create a comprehensive poster displaying the retail cuts of beef. The poster will include clear and accurate visuals of each cut, along with descriptive labels and key information about their location on the animal, tenderness, flavor profile, and recommended cooking methods. The poster will be assessed based on the completeness of information, and overall visual appeal, ensuring that the new butcher gains a thorough understanding of retail cuts of beef.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 9: Identification and Fabrication of Carcass and Box Pork

Competencies and Suggested Objectives
1. Identify and safely fabricate cuts of pork and discuss market prices. DOK2 a. Identify carcass break cuts of pork. b. Make retail cuts of the following: • Ham • Loin • Shoulder (Boston butt and picnic) • Side
2. Identify and safely fabricate retail variety cuts of pork and discuss market prices. DOK2 a. Make retail cuts of the following: • Tongue liver • Chitterlings • Stomach • Kidneys • Snouts

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 10: Identification and Fabrication of Carcass Lamb and Goat

Competencies and Suggested Objectives
1. Identify and safely fabricate cuts of lamb and goat and discuss market prices. DOK2 a. Identify carcass break cuts of lamb and goat. b. Make retail cuts of the following: • Leg • Loin • Rib • Shoulder • Foreshank and breast

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 11: Identification and Fabrication of Poultry and Fish

Competencies and Suggested Objectives
1. Identify and safely fabricate cuts of poultry and discuss market prices. DOK2 a. Identify carcass break cuts of poultry. b. Make retail cuts of the following: • Breast quarter • Leg quarter • Back quarter
2. Identify and perform, when applicable, cuts of poultry. DOK2 a. Identify and perform retail cuts of heart. b. Identify and perform retail cuts of liver. c. Identify and perform retail cuts of gizzard. d. Identify and perform retail cuts of neck.
3. Identify and process retail cuts of fish. DOK2 a. Identify retail cuts of fish. b. Process retail cuts of fish.

Enrichment
Fry Cook Guidebook Students are tasked with demonstrating the correct way of cutting up a chicken for frying, with a focus on safety and sanitation. The lesson begins with a visual demonstration, followed by hands-on practice where students cut chickens into wings, legs, thighs, and breast halves. To document their learning, students will create a "Chicken Cutting Guidebook" containing step-by-step instructions, diagrams, safety tips, and personal reflections. This project serves as a valuable resource for future reference. At the culmination of the activity, students' cutting techniques and adherence to safety protocols will be assessed to ensure proficiency and understanding.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 12: Identification and Fabrication of Wild Game

Competencies and Suggested Objectives
1. Identify and safely fabricate cuts of wild game and discuss market prices. DOK2 a. Make cuts of the following: • Top round • Bottom round • Tip roast • Eye round • Loin eye • Ribs b. Debone front shoulders.
2. Prepare wild game specialty products. DOK2 a. Prepare various sausage products. b. Prepare ground products. c. Discuss the preparation of jerky products.

Enrichment
Deer Processing for Charity Donation The local wildlife department has tasked the high school's Meat Science and Muscle Biology class with processing twenty deer for charity donation. Students will learn deer butchering techniques, including skinning, quartering, and cutting the meat into various products like steaks, roasts, and ground meat. The activity emphasizes hands-on instruction and demonstration, focusing on food safety practices and sanitation procedures to ensure the processed meat is safe for consumption. The measurable outcome involves students successfully transforming the deer into specified products within a given timeframe, assessed based on the accuracy of cuts, adherence to safety protocols, and the overall quality of the processed meat. Additionally, students will document the process, providing step-by-step instructions, safety tips, and reflections on their learning experience.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 13: Automation of the Modern Meat Industry

Competencies and Suggested Objectives
1. Observe and discuss the automated processing of various types of meat. DOK2 a. Discuss and/or apply step-by-step procedures for the automated slaughtering and fabrication processing of beef, pork, lamb, poultry, and fish. b. Discuss and/or apply step-by-step procedures for the automated processing of beef, pork, lamb, poultry, and fish.
2. Explore the advancements of artificial intelligence and robotics within the meat industry. DOK3

Enrichment
Artificial Intelligence Project Students will research and identify examples of how artificial intelligence (AI) principles can be applied within meat processing. Examples may include computer vision for quality control or predictive analytics for inventory management. Using their findings, students will develop a written report detailing specific examples, case studies, and potential benefits and challenges of implementing AI technologies in the industry. The report will be assessed based on the depth of research, critical analysis, clarity of communication, and recommendations for future implementation or research directions in AI for meat processing.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 14: Quality and Yield Grading

Competencies and Suggested Objectives
1. Explain quality and yield grades for beef and determine classifications of beef. DOK2 a. Explain quality grades for beef. b. Explain yield grades of beef. c. Determine the classification of beef. d. Estimate the amount of kidney fat, pelvic fat, and age. e. Estimate the amount of marbling in a ribeye. f. Discuss the price difference between different quality and yield grades.
2. Explain quality grades and determine the classification of pork. DOK2 a. Explain quality grades for pork. b. Determine the classification of pork.
3. Explain quality and yield grades for lamb and determine classifications of sheep. DOK2 a. Explain the quality grades of lamb. b. Explain the yield grades of lamb. c. Determine the classification of sheep.
4. Explain quality grades in poultry. DOK2 a. Explain the grades of poultry. b. Discuss poultry classifications.

Enrichment
Selecting High-Quality Ribeye Steaks for a Restaurant Chain Students will assume the role of a food buyer tasked with evaluating four different high-end ribeye steaks for a major restaurant chain. Guided by guidelines from the job sheet/performance rubric in the teacher resource document, students will carefully assess each ribeye based on factors like marbling, tenderness, color, and overall quality, aiming to determine the best option for the business. Instead of a job sheet or performance rubric, students will compile a detailed report summarizing their evaluation, including a thorough assessment of quality attributes, justification for the selected ribeye, and recommendations for its use in the restaurant chain's menu offerings. Assessment criteria will focus on accuracy, depth of analysis, clarity of presentation, and alignment with industry standards

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 15: Curing, Smoking, and Sausage Making

Competencies and Suggested Objectives
1. Explain and demonstrate meat curing and smoking processes. DOK2 a. Define curing, smoking, and sausage-making terms. b. Describe the functions of curing and smoking. c. Describe meat curing ingredients and calculate the correct amount of each. d. Explain methods of meat curing. e. Identify and use equipment for the smoking and curing process. f. Describe the process of curing bacon in brine solution. g. Describe the process of curing jowl in brine solution. h. Pump the shoulders for curing. i. Pump the hams for curing. j. Pump the loin for curing. k. Discuss the process of smoking a shoulder, ham, loins, bacon, and jowls.
2. Explain and demonstrate the process of sausage-making. DOK2 a. Prepare a brine solution and season the mixture. b. Mix and grind meat with seasoning. c. Stuff sausage in a casing. d. Smoke sausage in a smoker. e. Read a salinometer.
3. Discuss restricted ingredients within processed meats (e.g. storage time and regulations). DOK2

Enrichment
Crafting a Sausage Recipe Book Students will take on the role of the owner of a well-known sausage company to create a "how-to" sausage recipe book. This book will serve as a valuable resource, providing detailed instructions on safety, sanitation, curing, mixing, stuffing, and smoking procedures. Students will compile a traditional/physical prototype or a digital prototype. The prototype will be assessed based on the completeness of content, accuracy of procedures, clarity of instructions, and adherence to safety and sanitation standards. Visual aids such as diagrams or illustrations may be included to enhance understanding and engagement. The measurable outcome will be the creation of a high-quality sausage recipe book that reflects students' knowledge, skills, and commitment to excellence in sausage making.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 16: Special Topics in Meat Science and Muscle Biology II

Competencies and Suggested Objectives
1. Investigate new and emerging technologies, practices, trends, and issues associated with meat science and muscle biology. DOK3 a. Prepare a report on a new and emerging technology associated with meat science and muscle biology. b. Prepare a report on a current trend or issue associated with meat science and muscle biology.
2. Complete school-to-career activities related to meat science and muscle biology. DOK2 a. Participate in a school-to-career activity (shadowing, mentoring, career fair, etc.) related to meat science and muscle biology. b. Investigate educational opportunities related to meat science and muscle biology at the postsecondary level. c. Describe national standards and certification/licensing procedures related to meat science and muscle biology. d. Describe the role of trade organizations, associations, and unions as related to meat science and muscle biology.
3. Demonstrate related academic skills and workplace skills associated with meat science and muscle biology. DOK2 a. Complete a cooperative project (paper, presentation, or demonstration) associated with an academic subject and meat science and muscle biology. b. Practice human relations skills (team participation, client/customer service, leadership, negotiation, working with culturally diverse groups, etc.) related to meat science and muscle biology. c. Research work ethics and employer expectations of employees in meat science and muscle biology.
4. Investigate the concepts of quality assurance as related to meat science and muscle biology. DOK3 a. Describe concepts and methods for measuring quality related to food products (meats). b. Apply quality concepts in the meat science and muscle biology laboratory.
5. Examine global economic factors, trends, and changes related to meat science and muscle biology. DOK2 a. Define and discuss the concept of global economics and competition. b. Describe global economic factors and competition as related to meat science and muscle biology. c. Identify regions and other countries that compete in meat science and muscle biology.

Enrichment
Exploring Current Trends in the Meat Industry Students will take on the role of food science workers responsible for staying abreast of the latest trends affecting the meat industry. Their task involves delivering a presentation to their

peers, representing a major livestock board, focusing on current trends, technologies, and job opportunities in today's market. Students will conduct comprehensive research to identify key trends such as alternative meat products and advancements in meat processing technology. Using the presentation rubric from the teacher resource document as a guide, students will craft a compelling presentation or written report that effectively communicates their insights and findings. Assessment will be based on criteria such as content relevance, depth of analysis, clarity of communication, and the proposal of actionable recommendations. The measurable outcome will be the successful delivery of insights that inform and engage their peers on the latest developments in the meat industry.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.
Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 17: Immersion into FFA and Supervised Agriculture Experience(SAE) for All

Competencies and Suggested Objectives

1. Participate in local, state, and/or national FFA activities that provide opportunities for leadership development and career exploration. DOK3
   a. Actively participate in FFA activities.
      - Leadership Development Events (LDE)
      - Career Development Events (CDE)
        - Meats Evaluation and Technology
        - Environmental and Natural Resources (Envirothon)
        - Equipment and Tool Identification
      - Leadership retreats or conferences
      - Industry-related seminars, workshops, or conferences
      - Other related FFA activities
2. Apply concepts learned from the foundational SAE program to continue the progression of immersion SAEs. DOK4
   a. Redefine and adjust requirements of agreements between students, parents, supervisor, and/or employer.
   b. Update SAE digital records using the state-approved record-keeping system.
      - SAE program goals
      - Student inventory related to the SAE program
      - Expense records
      - Income/gift and scholarship records
      - Skill-attainment records
      - Leadership-activity records and participation in FFA activities
      - Community service hours
      - Student Recording of the WBL experiences on the state-approved digital record-keeping platform.
        - Ensure the hours recorded get evaluated by external supervisor (s) as required by the state of Mississippi.
   c. Complete degree and proficiency award applications as they apply to the SAE.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.

Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Student Competency Profile

Student's Name: _____

This record is intended to serve as a method of noting student achievement of the competencies in each unit. It can be duplicated for each student, and it can serve as a cumulative record of competencies achieved in the course.

In the blank before each competency, place the date on which the student mastered the competency.

Unit 1: Orientation to Meat Science and Muscle Biology		
	1.	Explain the science and trends in slaughtering and processing.
	2.	Describe factors affecting consumption and industry patterns.
	3.	Investigate the processing of wildlife and other geographic or culturally relevant meat practices.
Unit 2: The National FFA Organization and Career Development		
	1.	Explore the integral relationship between FFA and agricultural education.
	2.	Explore the role of the FFA in promoting leadership, personal growth, and career success through 21st-century skills standards.
	3.	Describe the role of 21st-century skills, work ethic, and values in establishing and building a successful career.
	4.	Develop a foundational SAE and maintain digital records in the state-approved record-keeping system
Unit 3: Safety, Sanitation, Equipment, and Facility Maintenance		
	1.	Explain general meat laboratory safety requirements.
	2.	Discuss sanitation as it applies to a meat processing facility.
	3.	Investigate federal regulations related to meat processing.
	4.	Identify and safely use equipment for meat cutting, packing, and processing.
	5.	Demonstrate equipment maintenance used in a meat processing facility.
	6.	Maintain a safe and sanitary facility.
Unit 4: Principles of Livestock Slaughter		
	1.	Explain terms and procedures associated with livestock slaughter.
	2.	Discuss types, cleaning, use, and maintenance of slaughter facility and equipment.
	3.	Demonstrate an understanding of food safety protocols and procedures during food processing.
Unit 5: Packaging, Marketing, and Retail Sales		
	1.	Compare and contrast market prices, consumer trends, supply and demand, and the effects on meat prices.

	2.	Investigate the breaking down of muscles from various animals and perform a cutting test if applicable.
	3.	Discuss packaging techniques and technological advancements for retail meat.
	4.	Examine marketing principles related to the display of meat.
Unit 6: Special Topics in Meat Science and Muscle Biology		
	1.	Investigate new and emerging technologies, practices, trends, and issues associated with meat science and muscle biology.
	2.	Complete school-to-career activities related to meat science and muscle biology.
	3.	Demonstrate related academic skills and workplace skills associated with meat science and muscle biology.
	4.	Investigate the concepts of quality assurance as related to meat science and muscle biology.
	5.	Examine global economic factors, trends, and changes related to meat science and muscle biology.
Unit 7: Meat Science and Muscle Biology Careers and FFA Leadership		
	1.	Review safety rules and behavior.
	2.	Investigate and develop skills necessary for pursuing a career in Meat Science.
	3.	Actively participate in the FFA chapter program of activities.
	4.	Develop and present a 3 to 5-minute presentation on a Meat Science topic.
	5.	Develop an immersion SAE and maintain digital records in the state approved record keeping system.
Unit 8: Identification and Fabrication of Carcass and Box Beef		
	1.	Identify and safely fabricate cuts of beef and discuss market prices.
	2.	Identify and safely fabricate variety cuts of beef and discuss market prices.
Unit 9: Identification and Fabrication of Carcass and Box Pork		
	1.	Identify and safely fabricate cuts of pork and discuss market prices.
	2.	Identify and safely fabricate retail variety cuts of pork and discuss market prices
Unit 10: Identification and Fabrication of Carcass Lamb and Goat		
	1.	Identify and safely fabricate cuts of lamb and goat and discuss market prices.
Unit 11: Identification and Fabrication of Poultry and Fish		
	1.	Identify and safely fabricate cuts of poultry and discuss market prices.
	2.	Identify variety cuts of poultry.
	3.	Identify and process retail cuts of fish.
Unit 12: Identification and Fabrication of Wild Game		
	1.	Identify and safely fabricate cuts of wild game and discuss market prices.
	2.	Prepare wild game specialty products.
Unit 13: Automation of the Modern Meat Industry		

	1.	Observe and discuss the automated processing of various types of meat.
	2.	Explore the advancements of artificial intelligence and robotics within the meat industry.
Unit 14: Quality and Yield Grading		
	1.	Explain quality and yield grades for beef and determine classifications of beef.
	2.	Explain quality grades and determine classification of pork.
	3.	Explain quality and yield grades for lamb and determine classifications of sheep.
	4.	Explain quality grades in poultry.
Unit 15: Curing, Smoking, and Sausage Making		
	1.	Explain and demonstrate meat curing and smoking processes.
	2.	Explain and demonstrate the process of sausage making.
	3.	Discuss restricted ingredients within processed meats (e.g. storage time and regulations).
Unit 16: Special Topics in Meat Science and Muscle Biology II		
	1.	Investigate new and emerging technologies, practices, trends, and issues associated with meat science and muscle biology.
	2.	Complete school-to-career activities related to meat science and muscle biology.
	3.	Demonstrate related academic skills and workplace skills associated with meat science and muscle biology.
	4.	Investigate the concepts of quality assurance as related to meat science and muscle biology.
	5.	Examine global economic factors, trends, and changes related to meat science and muscle biology.
Unit 17: Immersion into FFA and Supervised Agriculture Experience (SAE) for All		
	1.	Participate in local, state, and/or national FFA activities that provide opportunities for leadership development and career exploration.
	2.	Apply concepts learned from the foundational SAE program to continue the progression of immersion SAEs.

Appendix A: Framework for AFNR Content Standards and Performance Elements Crosswalk for Agricultural and Natural Resources

	Units	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Standards																		
ABS			X	X		X	X	X						X		X	X	X
AS		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BS		X	X	X	X	X			X	X	X	X	X	X	X			X
CRP		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CS		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ES		X	X	X			X		X	X	X	X	X	X	X	X	X	X
FPP-		X	X	X	X	X		X						X	X	X		X
NRS		X	X															X
PS					X	X										X		X
PST			X	X		X		X	X	X	X	X	X	X	X	X		X

AFNR Pathway - Content Standards and Performance Elements

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Within each pathway, the standards are organized as follows:

- *Common Career Technical Core (CCTC) Standards* – These are the standards for Animal Systems (AG-AS) from the 2012 version of the Common Career and Technical Core Standards, which are owned by the National Association of State Directors of Career and Technical Education/National Career Technical Education Foundation and are used here with permission. These statements define what students should know and be able to do after completing instruction in a program of study for this pathway.
- *Performance Indicators* – These statements distill each CCTC Standard into more discrete indicators of the knowledge and skills students should attain through a program of study in this pathway. Attainment of the knowledge and skills outlined in the performance indicators is intended to demonstrate an acceptable level of proficiency with the related CCTC Standard at the conclusion of a program of study in this area.

ABS Agribusiness Systems Career Pathway Content Standards

The Agribusiness Systems (ABS) Career Pathway encompasses the study of agribusinesses and their management including, but not limited to, record keeping, budget management (cash and credit), and business planning, and sales and marketing. Students completing a program of study in this pathway will demonstrate competence in the application of principles and techniques for the planning, development, application and management of agribusiness systems in AFNR settings.

ABS.01 CCTC Standard: Apply management planning principles in AFNR businesses.

1. Apply micro- and macroeconomic principles to plan and manage inputs and outputs in an AFNR business.
2. Read, interpret, evaluate and write statements of purpose to guide business goals, objectives and resource allocation.

3. Devise and apply management skills to organize and run an AFNR business in an efficient, legal and ethical manner.
4. Evaluate, develop and implement procedures used to recruit, train and retain productive human resources for AFNR businesses.

ABS.02 CCTC Standard: Use record keeping to accomplish AFNR business objectives, manage budgets and comply with laws and regulations.

1. Apply fundamental accounting principles, systems, tools and applicable laws and regulations to record, track and audit AFNR business transactions (e.g., accounts, debits, credits, assets, liabilities, equity, etc.).
2. Assemble, interpret and analyze financial information and reports to monitor AFNR business performance and support decision-making (e.g., income statements, balance sheets, cash-flow analysis, inventory reports, break-even analysis, return on investment, taxes, etc.).

ABS.03 CCTC Standard: Manage cash budgets, credit budgets and credit for an AFNR business using generally accepted accounting principles.

1. Develop, assess and manage cash budgets to achieve AFNR business goals.
2. Analyze credit needs and manage credit budgets to achieve AFNR business goals.

ABS.04 CCTC Standard: Develop a business plan for an AFNR business.

1. Analyze characteristics and planning requirements associated with developing business plans for different types of AFNR businesses.
2. Develop production and operational plans for an AFNR business.
3. Identify and apply strategies to manage or mitigate risk.

ABS.05 CCTC Standard: Use sales and marketing principles to accomplish AFNR business objectives.

1. Analyze the role of markets, trade, competition and price in relation to an AFNR business sales and marketing plans.
2. Assess and apply sales principles and skills to accomplish AFNR business objectives.
3. Assess marketing principles and develop marketing plans to accomplish AFNR business objectives.

AS Animal Systems Career Pathway Content Standards

The Animal Systems (AS) Career Pathway encompasses the study of animal systems, including content areas such as life processes, health, nutrition, genetics, and management and processing, as applied to small animals, aquaculture, exotic animals, livestock, dairy, horses and/or poultry Students completing a program of study in this pathway will demonstrate competence in the application of principles and techniques for the development, application and management of animal systems in AFNR settings.

AS.01 CCTC Standard: Analyze historic and current trends impacting the animal systems industry.

1. Evaluate the development and implications of animal origin, domestication and distribution on production practices and the environment

2. Assess and select animal production methods for use in animal systems based upon their effectiveness and impacts.
3. Analyze and apply laws and sustainable practices to animal agriculture from a global perspective

AS.02 CCTC Standard: Utilize best-practice protocols based upon animal behaviors for animal husbandry and welfare.

1. Demonstrate management techniques that ensure animal welfare
2. Analyze procedures to ensure that animal products are safe for consumption (e.g., use in food system, etc.).

AS.03 CCTC Standard: Design and provide proper animal nutrition to achieve desired outcomes for performance, development, reproduction and/or economic production

1. Analyze the nutritional needs of animals
2. Analyze feed rations and assess if they meet the nutritional needs of animals.
3. Utilize industry tools to make animal nutrition decisions.

AS.04 CCTC Standard: Apply principles of animal reproduction to achieve desired outcomes for performance, development and/or economic production.

1. Evaluate animals for breeding readiness and soundness.
2. Apply scientific principles to select and care for breeding animals.
3. Apply scientific principles to breed animals.

AS.05 CCTC Standard: Evaluate environmental factors affecting animal performance and implement procedures for enhancing performance and animal health.

1. Design animal housing, equipment and handling facilities for the major systems of animal production.
2. Comply with government regulations and safety standards for facilities used in animal production.

AS.06 CCTC Standard: Classify, evaluate, and select animals based on anatomical and physiological characteristics.

1. Classify animals according to taxonomic classification systems and use (e.g. agricultural, companion, etc.).
2. Apply principles of comparative anatomy and physiology to uses within various animal systems
3. Select and train animals for specific purposes and maximum performance based on anatomy and physiology

AS.07 CCTC Standard: Apply principles of effective animal health care.

1. Design programs to prevent animal diseases, parasites and other disorders and ensure animal welfare.
2. Analyze biosecurity measures utilized to protect the welfare of animals on a local, state, national, and global level

AS.08 CCTC Standard: Analyze environmental factors associated with animal production.

1. Design and implement methods to reduce the effects of animal production on the environment.

2. Evaluate the effects of environmental conditions on animals and create plans to ensure favorable environments for animals.

CRP Common Career Technical Core Career Ready Practices Content Standards

The CCTC CRPs encompass fundamental skills and practices that all students should acquire to be career ready such as: responsibility, productivity, healthy choices, maintaining personal finances, communication, decision-making, creativity and innovation, critical-thinking, problem solving, integrity, ethical leadership, management, career planning, technology use and cultural/global competency, Students completing a program of study in any AFNR career pathway will demonstrate the knowledge, skills and behaviors that are important to career ready through experiences in a variety of settings (e.g., classroom, CTSO, work-based learning, community etc.)

CRP.01 CCTC Standard: Act as a responsible and contributing citizen and employee.

1. Model personal responsibility in the workplace and community.
2. Evaluate and consider the near-term and long-term impacts of personal and professional decisions on employers and community before taking action.
3. Identify and act upon opportunities for professional and civic service at work and in the community.

CRP.02 CCTC Standard: Apply appropriate academic and technical skills.

1. Use strategic thinking to connect and apply academic learning, knowledge and skills to solve problems in the workplace and community.
2. Use strategic thinking to connect and apply technical concepts to solve problems in the workplace and community.

CRP.03 CCTC Standard: Attend to personal health and financial well-being.

1. Design and implement a personal wellness plan.
2. Design and implement a personal financial management plan.

CRP.04 CCTC Standard: Communicate clearly, effectively and with reason.

1. Speak using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.
2. Produce clear, reasoned and coherent written and visual communication in formal and informal settings.
3. Model active listening strategies when interacting with others in formal and informal settings.

CRP.05 CCTC Standard: Consider the environmental, social and economic impacts of decisions.

1. Assess, identify and synthesize the information and resources needed to make decisions that positively impact the workplace and community.
2. Make, defend and evaluate decisions at work and in the community using information about the potential environmental, social and economic impacts.

CRP.06 CCTC Standard: Demonstrate creativity and innovation.

1. Synthesize information, knowledge and experience to generate original ideas and challenge assumptions in the workplace and community.
2. Assess a variety of workplace and community situations to identify ways to add value and improve the efficiency of processes and procedures.
3. Create and execute a plan of action to act upon new ideas and introduce innovations to workplace and community organizations.

CRP.07 CCTC Standard: Employ valid and reliable research strategies.

1. Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.
2. Evaluate the validity of sources and data used when considering the adoption of new technologies, practices and ideas in the workplace and community.

CRP.08 CCTC Standard: Utilize critical thinking to make sense of problems and persevere in solving them.

1. Apply reason and logic to evaluate workplace and community situations from multiple perspectives.
2. Investigate, prioritize and select solutions to solve problems in the workplace and community.
3. Establish plans to solve workplace and community problems and execute them with resiliency.

CRP.09 CCTC Standard: Model integrity, ethical leadership and effective management.

1. Model characteristics of ethical and effective leaders in the workplace and community (e.g. integrity, self-awareness, self-regulation, etc.).
2. Implement personal management skills to function effectively and efficiently in the workplace (e.g., time management, planning, prioritizing, etc.).
3. Demonstrate behaviors that contribute to a positive morale and culture in the workplace and community (e.g., positively influencing others, effectively communicating, etc.).

CRP.10 CCTC Standard: Plan education and career path aligned to personal goals.

1. Identify career opportunities within a Career Cluster that match personal interests, talents, goals, and preferences.
2. Examine career advancement requirements (e.g., education, certification, training, etc.) and create goals for continuous growth in a chosen career.
3. Develop relationships with and assimilate input and/or advice from experts (e.g., counselors, mentors, etc.) to plan career and personal goals in a chosen career area.
4. Identify, prepare, update, and improve the tools and skills necessary to pursue a chosen career path.

CRP.11 CCTC Standard: Use technology to enhance productivity.

1. Research, select, and use new technologies, tools, and applications to maximize productivity in the workplace and community.

2. Evaluate personal and organizational risks of technology use and take actions to prevent or minimize risks in the workplace and community.

CRP.12 CCTC Standard: Work productively in teams while using cultural/global competence.

1. Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.
2. Create and implement strategies to engage team members to work toward team and organizational goals in a variety of workplace and community situations (e.g., meetings, presentations, etc.).

CS Agriculture, Food, and Natural Resources Cluster Skill Content Standards

The AFNR Cluster Skills (CS) encompasses the study of fundamental knowledge and skills related to all AFNR professions Students completing a program of study in any AFNR career pathway will demonstrate fundamental knowledge of the nature, scope and relationships of AFNR systems and the skills necessary for analysis of current and historical issues and trends; application of technologies; safety, health and environmental practices; stewardship of natural resources; and exploration of career opportunities.

CS.01 CCTC Standard: Analyze how issues, trends, technologies, and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster.

1. Research, examine and discuss issues and trends that impact AFNR systems on local, state, national and global levels.
2. Examine technologies and analyze their impact on AFNR systems.
3. Identify public policies and examine their impact on AFNR systems.

CS.02 CCTC Standard: Evaluate the nature and scope of the Agriculture, Food & Natural Resources Career Cluster and the role of agriculture, food and natural resources (AFNR) in society and the economy.

1. Research and use geographic and economic data to solve problems in AFNR systems.
2. Examine the components of the AFNR systems and assess their impact on the local, state, national and global society and economy.

CS.03 CCTC Standard: Examine and summarize the importance of health, safety and environmental management systems in AFNR workplaces.

1. Identify and explain the implications of required regulations to maintain and improve safety, health and environmental management systems.
2. Develop and implement a plan to maintain and improve health, safety and environmental compliance and performance.
3. Apply health and safety practices to AFNR workplaces.
4. Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.

CS.04 CCTC Standard: Demonstrate stewardship of natural resources in AFNR activities.

1. Identify and implement practices to steward natural resources in different AFNR systems.

2. Assess and explain the natural resource related trends, technologies and policies that impact AFNR systems.

CS.05 CCTC Standard: Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources career pathways.

1. Evaluate and implement the steps and requirements to pursue a career opportunity in each of the AFNR career pathways (e.g., goals, degrees, certifications, resumes, cover letter, portfolios, interviews, etc.).

CS.06 CCTC Standard: Analyze the interaction among AFNR systems in the production, processing and management of food, fiber and fuel and the sustainable use of natural resources.

1. Examine and explain foundational cycles and systems of AFNR.
2. Analyze and explain the connection and relationships between different AFNR systems on a national and global level.

BS Biotechnology Systems Career Pathway Content Standards

The Biotechnology Systems (BS) Career Pathway encompasses the study of using data and scientific techniques to solve problems concerning living organisms with an emphasis on applications to agriculture, food and natural resource systems. Students completing a program of study in this pathway will demonstrate competence in the application of principles and techniques for the development, application and management of biotechnology in the context of AFNR.

BS.01 NCAE Standard: Assess factors that have influenced the evolution of biotechnology in agriculture (e.g., historical events, societal trends, ethical and legal implications, etc.).

1. Investigate and explain the relationship between past, current and emerging applications of biotechnology in agriculture (e.g., major innovators, historical developments, potential applications of biotechnology, etc.).
2. Evaluate the scope and implications of regulatory agencies on applications of biotechnology in agriculture and protection of public interests (e.g., health, safety, environmental issues, etc.).
3. Analyze the relationship and implications of bioethics, laws and public perceptions on applications of biotechnology in agriculture (e.g., ethical, legal, social, cultural issues).

BS.02 NCAE Standard: Demonstrate proficiency by safely applying appropriate laboratory skills to complete tasks in a biotechnology research and development environment (e.g., standard operating procedures, record keeping, aseptic technique, equipment maintenance, etc.).

1. Read, document, evaluate, and secure accurate laboratory records of experimental protocols, observations and results.
2. Implement standard operating procedures for the proper maintenance, use, and sterilization of equipment in a laboratory.
3. Apply standard operating procedures for the safe handling of biological and chemical materials in a laboratory.

4. Safely manage and dispose of biological materials, chemicals, and wastes according to standard operating procedures.
5. Examine and perform scientific procedures using microbes, DNA, RNA, and proteins in a laboratory.

BS.03 NCAE Standard: Demonstrate the application of biotechnology to solve problems in Agriculture, Food and Natural Resources (AFNR) systems (e.g., bioengineering, food processing, waste management, horticulture, forestry, livestock, crops, etc.).

1. Apply biotechnology principles, techniques, and processes to create transgenic species through genetic engineering.
2. Apply biotechnology principles, techniques, and processes to enhance the production of food through the use of microorganisms and enzymes.
3. Apply biotechnology principles, techniques, and processes to protect the environment and maximize use of natural resources (e.g., biomass, bioprospecting, industrial biotechnology, etc.).
4. Apply biotechnology principles, techniques, and processes to enhance plant and animal care and production (e.g., selective breeding, pharmaceuticals, biodiversity, etc.).
5. Apply biotechnology principles, techniques, and processes to produce biofuels (e.g., fermentation, transesterification, methanogenesis, etc.).
6. Apply biotechnology principles, techniques, and processes to improve waste management (e.g., genetically modified organisms, bioremediation, etc.).

ES Environmental Service Systems Career Pathway Content Standards

The Environmental Service Systems (ESS) Career Pathway encompasses the study of systems, instruments and technology used to monitor and minimize the impact of human activity on environmental systems. Students completing a program of study in this pathway will demonstrate competence in the application of principles and techniques for the development, application, and management of environmental service systems in AFNR settings.

ESS.01 CCTC Standard: Use analytical procedures and instruments to manage environmental service systems.

1. Analyze and interpret laboratory and field samples in environmental service systems.
2. Properly utilize scientific instruments in environmental monitoring situations (e.g., laboratory equipment, environmental monitoring instruments, etc.).

ESS.02 CCTC Standard: Evaluate the impact of public policies and regulations on environmental service system operations.

1. Interpret and evaluate the impact of laws, agencies, policies, and practices affecting environmental service systems.
2. Compare and contrast the impact of current trends on regulation of environmental service systems (e.g., climate change, population growth, international trade, etc.).

3. Examine and summarize the impact of public perceptions and social movements on the regulation of environmental service systems.

ESS.03 CCTC Standard: Develop proposed solutions to environmental issues, problems and applications using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry, and ecology.

1. Apply meteorology principles to environmental service systems.
2. Apply soil science and hydrology principles to environmental service systems.
3. Apply chemistry principles to environmental service systems.
4. Apply microbiology principles to environmental service systems.
5. Apply ecology principles to environmental service systems.

ESS.04 CCTC Standard: Demonstrate the operation of environmental service systems (e.g., pollution control, water treatment, wastewater treatment, solid waste management and energy conservation).

1. Use pollution control measures to maintain a safe facility and environment.
2. Manage safe disposal of all categories of solid waste in environmental service systems.
3. Apply techniques to ensure a safe supply of drinking water and adequate treatment of wastewater according to applicable rules and regulations.
4. Compare and contrast the impact of conventional and alternative energy sources on the environment and operation of environmental service systems.

ESS.05 CCTC Standard: Use tools, equipment, machinery and technology common to tasks in environmental service systems.

1. Use technological and mathematical tools to map land, facilities and infrastructure for environmental service systems.
2. Perform assessments of environmental conditions using equipment, machinery and technology.

FPP Food Products and Processing Systems Career Pathway Content Standards

The Food Products and Processing Systems (FPP) Career Pathway encompasses the study of food safety and sanitation; nutrition, biology, microbiology, chemistry, and human behavior in local and global food systems; food selection and processing for storage, distribution and consumption; and the historical and current development of the food industry. Students completing a program of study in this pathway will demonstrate competence in the application of principles and techniques for the development, application, and management of food products and processing systems in AFNR settings.

FPP.01 CCTC Standard: Develop and implement procedures to ensure safety, sanitation, and quality in food product and processing facilities.

1. Analyze and manage operational and safety procedures in food products and processing facilities.
2. Apply food safety and sanitation procedures in the handling and processing of food products to ensure food quality.

3. Apply food safety procedures when storing food products to ensure food quality.

FPP.02 CCTC Standard: Apply principles of nutrition, biology, microbiology, chemistry, and human behavior to the development of food products.

1. Apply principles of nutrition and biology to develop food products that provide a safe, wholesome, and nutritious food supply for local and global food systems.
2. Apply principles of microbiology and chemistry to develop food products to provide a safe, wholesome, and nutritious food supply for local and global food systems.
3. Apply principles of human behavior to develop food products to provide a safe, wholesome, and nutritious food supply for local and global food systems.

FPP.03 CCTC Standard: Select and process food products for storage, distribution, and consumption.

1. Implement selection, evaluation, and inspection techniques to ensure safe and quality food products.
2. Design and apply techniques of food processing, preservation, packaging, and presentation for distribution and consumption of food products.
3. Create food distribution plans and procedures to ensure safe delivery of food products.

FPP.04 CCTC Standard: Explain the scope of the food industry and the historical and current developments of food product and processing.

1. Examine the scope of the food industry by evaluating local and global policies, trends and customs for food production.
2. Evaluate the significance and implications of changes and trends in the food products and processing industry in the local and global food systems.
3. Identify and explain the purpose of industry organizations, groups, and regulatory agencies that influence the local and global food systems.

NRS Natural Resource Systems Career Pathway Content Standards

The Natural Resource Systems (NRS) Career Pathway encompasses the study of the management, protection, enhancement, and improvement of soil, water, wildlife, forests, and air as natural resources. Students completing a program of study in this pathway will demonstrate competence in the application of principles and techniques for the development, application, and management of natural resource systems in AFNR settings.

NRS.01 CCTC Standard: Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals.

1. Apply methods of classification to examine natural resource availability and ecosystem function in a particular region
2. Classify different types of natural resources in order to enable protection, conservation, enhancement, and management in a particular geographical region.

3. Apply ecological concepts and principles to atmospheric natural resource systems.
4. Apply ecological concepts and principles to aquatic natural resource systems.
5. Apply ecological concepts and principles to terrestrial natural resource systems.
6. Apply ecological concepts and principles to living organisms in natural resource systems.

NRS.02 CCTC Standard: Analyze the interrelationships between natural resources and humans.

1. Examine and interpret the purpose, enforcement, impact, and effectiveness of laws and agencies related to natural resource management, protection, enhancement, and improvement (e.g., water regulations, game laws, historic preservation laws, environmental policy, etc.).
2. Assess the impact of human activities on the availability of natural resources.
3. Analyze how modern perceptions of natural resource management, protection, enhancement, and improvement change and develop over time.
4. Examine and explain how economics affects the use of natural resources.
5. Communicate information to the public regarding topics related to the management, protection, enhancement, and improvement of natural resources.

NRS.03 CCTC Standard: Develop plans to ensure sustainable production and processing of natural resources.

1. Sustainably produce, harvest, process, and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.).
2. Demonstrate cartographic skills, tools, and technologies to aid in developing, implementing, and evaluating natural resource management plans.

NRS.04 CCTC Standard: Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

1. Demonstrate natural resource protection, maintenance, enhancement and improvement techniques.
2. Diagnose plant and wildlife diseases and follow protocols to prevent their spread.
3. Prevent or manage introduction of ecologically harmful species in a particular region.
4. Manage fires in natural resource systems.

PS Plant Science Systems Career Pathway Content Standards

The Plant Systems (PS) Career Pathway encompasses the study of plant life cycles, classifications, functions, structures, reproduction, media and nutrients, as wells as growth and cultural practices through the study of crops, turf grass, trees, shrubs, and/or ornamental plants. Students completing a program of study in this pathway will demonstrate competence in the application of principles and techniques for the development, application, and management of plant systems in AFNR settings.

PS.01 CCTC Standard: Develop and implement a crop management plan for a given production goal that accounts for environmental factors.

1. Determine the influence of environmental factors on plant growth.
2. Prepare and manage growing media for use in plant systems.
3. Develop and implement a fertilization plan for specific plants or crops.

PS.02 CCTC Standard: Apply principles of classification, plant anatomy, and plant physiology to plant production and management.

1. Classify plants according to taxonomic systems.
2. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.
3. Apply knowledge of plant physiology and energy conversion to plant systems.

PS.03 CCTC Standard: Propagate, culture, and harvest plants and plant products based on current industry standards.

1. Demonstrate plant propagation techniques in plant system activities.
2. Develop and implement a management plan for plant production.
3. Develop and implement a plan for integrated pest management for plant production.
4. Apply principles and practices of sustainable agriculture to plant production.
5. Harvest, handle and store crops according to current industry standards.

PS.04 CCTC Standard: Apply principles of design in plant systems to enhance an environment (e.g. floral, forest landscape, and farm).

1. Evaluating, identifying and preparing plants to enhance an environment.
2. Create designs using plants.

PST Power, Structural and Technical Systems Career Pathway Content Standards

The Power, Structural and Technical Systems (PST) Career Pathway encompasses the study of agricultural equipment, power systems, alternative fuel sources and precision technology, as well as woodworking, metalworking, welding and project planning for agricultural structures. Students completing a program of study in this pathway will demonstrate competence in the application of principles and techniques for the development, application and management of power, structural and technical systems in AFNR settings.

PST.01 CCTC Standard: Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural and technical systems.

1. Apply physical science and engineering principles to assess and select energy sources for AFNR power, structural and technical systems.

2. Apply physical science and engineering principles to design, implement and improve safe and efficient mechanical systems in AFNR situations.
3. Apply physical science principles to metal fabrication using a variety of welding and cutting processes (e.g., SMAW, GMAW, GTAW, fuel-oxygen and plasma arc torch, etc.).

PST.02 CCTC Standard: Operate and maintain AFNR mechanical equipment and power systems.

1. Perform preventative maintenance and scheduled service to maintain equipment, machinery, and power units used in AFNR settings.
2. Operate machinery and equipment while observing all safety precautions in AFNR settings.

PST.03 CCTC Standard: Service and repair AFNR mechanical equipment and power systems.

1. Troubleshoot, service, and repair components of internal combustion engines using manufacturers' guidelines.
2. Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.
3. Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment, and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).

PST.04 CCTC Standard: Plan, build and maintain AFNR structures.

1. Create sketches and plans for AFNR structures.
2. Determine structural requirements, specifications, and estimate costs for AFNR structures.
3. Follow architectural and mechanical plans to construct, maintain, and/or repair AFNR structures (e.g., material selection, site preparation and/or layout, plumbing, concrete/masonry, etc.).
4. Apply electrical wiring principles in AFNR structures.

PST.05 CCTC Standard: Use control, monitoring, geospatial, and other technologies in AFNR power, structural and technical systems.

1. Apply computer and other technologies (e.g., robotics, CNC, UAS, etc.) to solve problems and increase the efficiency of AFNR systems.
2. Prepare and/or use electrical drawings to design, install and troubleshoot electronic control systems in AFNR settings.
3. Apply geospatial technologies to solve problems and increase the efficiency of AFNR systems.

Appendix B: 2018 Mississippi College and Career-Readiness Standards for Biology

	Units	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Standards																		
BIO.1-		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
BIO.2		X	X		X		X	X						X	X	X		X
BIO.3-			X					X										X
BIO.4-		X	X		X			X	X	X	X	X	X	X	X	X		X
BIO.5-			X		X			X						X	X		X	X

2018 Mississippi College and Career-Readiness Standards for Biology

Meat Sciences and Muscle Biology

BIO.1 Cells as a system

a. Students will demonstrate an understanding of the characteristics of life and biological organization.
b. Students will analyze the structure and function of the macromolecules that make up cells.
c. Students will relate the diversity of organelles to a variety of specialized cellular functions.
d. Students will describe the structure of the cell membrane and analyze how the structure is related to its primary function of regulating transport in and out of cells to maintain homeostasis.
e. Students will develop and use models to explain the role of the cell cycle during growth, development, and maintenance in multicellular organisms.

BIO.2 Energy Transfer

Students will explain that cells transform energy through the processes of photosynthesis and cellular respiration to drive cellular functions.

BIO.3 Reproduction and Heredity

a. Students will develop and use models to explain the role of meiosis in the production of haploid gametes required for sexual reproduction.
b. Students will analyze and interpret data collected from probability calculations to explain the variation of expressed traits within a population.
c. Students will construct an explanation based on evidence to describe how the structure and nucleotide base sequence of DNA determines the structure of proteins or RNA that carry out essential functions of life.

BIO.4 Adaptations and Evolution

Students will analyze and interpret evidence to explain the unity and diversity of life.

BIO.5 Interdependence of Organisms and Their Environment

Students will investigate and evaluate the interdependence of living organisms and their environment.