2022 Agricultural Leadership

Program CIP: 01.0000—Agriculture, General

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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 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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Appreciation is expressed to the following professionals who provided guidance and insight throughout the development process:

Standards

Standards and alignment crosswalks are referenced in the appendix. 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 agricultural leadership curriculum is aligned to the following standards:

National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards
The National AFNR Career Cluster Content Standards were developed by the National Council on Agricultural Education to serve as a guide for 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. For each content standard, performance elements representing major topic areas with accompanying performance indicators were developed. Measurements of assessment of the performance elements and performance indicators were developed at the basic, intermediate, and advanced levels. A complete copy of the standards can be accessed at thecouncil.ffa.org/afnr. The National AFNR Career Cluster Content Standards are copyrighted to the National Council for Agricultural Education and are used by permission.

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. 21 *Framework Definitions* (2019).
battelleforkids.org/networks/p21/frameworks-resources

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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, call the RCU at 662.325.2510.

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Executive Summary

Pathway Description

Agricultural leadership is a one-credit course within the diversified agriculture pathway. All students must complete principles of agriscience before being allowed to enroll in agricultural leadership. This course is designed to introduce students to the skills, attitudes, and habits that will enable them to be good leaders in both the agriculture industry and life. The program includes instruction in workplace skills, time management, and money management related to agricultural leadership and personal development. Students in the course will participate in active-learning exercises, including integral activities of the FFA organization and supervised experiences. Students who successfully complete the competencies in this course will possess fundamental knowledge and skills that can be used to secure entry-level employment or as a foundation for continuing their education.

College, Career, and Certifications

No national industry-recognized certifications are known to exist at this time in the field of diversified agriculture. 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 10th-12th graders. Exceptions to this are a district-level decision based on class size, enrollment numbers, student maturity, and CTE delivery method. This is a classroom-based course. Therefore, a maximum of 25 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 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/curriculumdownload.

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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 of the training sessions provided, please contact the RCU at 662.325.2510.

Course Outlines

One 1-Carnegie Unit Course

This curriculum consists of one 1-credit course.

Agricultural Leadership—Course Code: 991701

Unit	Title	Hours
1	Introduction to Leadership and Personal Development	20
2	Communication Skills	15
3	Professional Presentations	30
4	Social Media	15
5	Team Building and Conflict Management	20
6	Workplace Essentials	30
7	Immersion Into FFA and Supervised Agricultural Experience (SAE) for All	10
Total		140

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Career Pathway Outlook

Overview

The agricultural sciences career cluster covers the broad field of occupations related to the production and use of plants and animals for food, fiber, aesthetic, and environmental purposes. According to the U.S. Department of Agriculture, during the next five years (2020-2025) 59,400 jobs are expected to open in food, agriculture, renewable natural resources, or the environment for graduates with bachelor's or higher degrees in those areas. Almost half of those jobs will be in management and business at 42%; 31% in science, technology, engineering, and math in agriculture; 13% in sustainable food and biomaterials production; and 14% in education, communication, and government services. According to USDA, agriculture, food, and related industries contributed $1.109 trillion to the U.S. gross domestic product (GDP) in 2019. The Mississippi Department of Agriculture and Commerce reports that agriculture is Mississippi's number one industry at $7.35 billion and employing approximately 17.4% of the state's workforce.

Diversified agriculture will target careers at the professional and technical levels in agriculture. Students enrolled in these courses should be better prepared to pursue degrees at the community college and four-year college levels.

Needs of the Future Workforce

Data for this synopsis were compiled from the Mississippi Department of Employment Security (MDES) (2018). Employment opportunities for each of the occupations are listed below:

Table 1.1: Current and Projected Occupation Report

Description	Jobs, 2018	Projected Jobs, 2028	Change (Number)	Change (Percent)	Average Yearly Earnings, 2021
Agricultural and Food Science Technicians	260	270	10	3.9%	$39,270
Agricultural Sciences Teachers, Postsecondary	150	160	10	6.7%	$93,260
Career/Technical Education Teachers, Middle School	320	350	30	9.4%	$47,270
Career/Technical Education Teachers, Secondary School	1220	1310	90	7.4%	$50,370
Farmers, Ranchers, and Other Agricultural Managers	1,790	1,840	20	2.8%	$55,830
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	980	1,090	110	11.2%	$40,270

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First-Line Supervisors/Managers of Farming, Fishing, and Forestry Workers	940	990	50	5.3%	$54,550
Foresters	190	200	10	5.3%	$52,660
Surveyors	450	470	20	4.4%	$48,600
Surveying and Mapping Technicians	530	550	20	3.8%	$39,840
Veterinarians	490	540	50	10.2%	$81,950
Veterinary Assistants and Laboratory Animal Caretakers	970	1,090	120	12.4%	$26,150
Veterinary Technologists and Technicians	570	630	60	10.5%	$35,890
Vocational Education Teachers, Postsecondary	1310	1320	10	0.8%	$51,590
Zoologists and Wildlife Biologists	260	270	10	3.9%	$70,200

Source: Mississippi Department of Employment Security; mdes.ms.gov (2021).

Perkins V Requirements and Academic Infusion
The agricultural leadership 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 careers in the agriculture industry. 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.

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Best Practices

Innovative Instructional Technologies

Classrooms should be equipped with tools that will teach today's digital learners through applicable and modern practices. The agricultural leadership 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 the student organization for this pathway and will foster the types of learning expected from the agricultural leadership curriculum. FFA provides students with growth opportunities and competitive events and opens the doors to the world of agriculture and scholarship opportunities.

Cooperative Learning

Cooperative learning can help students understand topics when independent learning cannot. Therefore, you will see several opportunities in the agricultural leadership 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 agricultural leadership curriculum provides opportunities for students to work together and help each other complete complex tasks. There are many field experiences within the agricultural leadership curriculum that will allow and encourage collaboration with professionals currently in the agriculture field.

Work-Based Learning

Work-based learning is an extension of understanding competencies taught in the agricultural leadership classroom. This curriculum is designed in a way that necessitates active involvement by the students in the community around them and the global environment. These real-world connections and applications link all types of students to knowledge, skills, and professional dispositions. Work-based learning should encompass ongoing and increasingly more complex involvement with local companies and agriscience professionals. Thus, supervised collaboration and immersion into the agriculture industry around the students are keys to students' success, knowledge, and skills development.

Professional Organizations

American Association for Agricultural Education (AAAE)
aaaeonline.org

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

Mississippi FFA/Mississippi Association of Vocational Agriculture Teachers (MAVAT)
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 are 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. Teachers are welcome to teach the competencies in other ways than the listed objectives if it allows for mastery of the competencies. Teachers are also allowed to teach the units and competencies in the order that they prefer, as long as they teach necessary material allotted for that specific course or credit they are teaching at the time.

Teacher Resources
Teacher resources for this curriculum may be found in multiple places. Many program areas have teacher resource documents that accompany the curriculum and can be downloaded from the same site as the curriculum. The teacher resource document contains references, lesson ideas, websites, teaching and assessment strategies, scenarios, skills to master, and other resources divided by unit. This document could be updated periodically by RCU staff. Please check the entire document, including the entries for each unit, regularly for new information. If you have something you would like to add or have a question about the document, call or email the RCU's instructional design specialist for your program. The teacher resource document can be downloaded at rcu.msstate.edu/curriculum/curriculumdownload.aspx. All teachers should request to be added to the Canvas Resource Guide for their course. This is where all resources will be housed in the future if they are not already. 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. If the agricultural leadership program is currently using the Mississippi Career Planning and Assessment System (MS-CPAS) as a measure of accountability, the enrichment section of material will not be tested. If this is the case, it is suggested to use the enrichment material when needed or desired by the teacher and if time allows in the class. This material will greatly enhance the learning experiences for students. If, however, the agricultural leadership program is using a national certification, work-based learning, or other measure of accountability that aligns with Perkins V as a quality indicator, this material could very well be tested 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.

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Unit 1: Introduction to Leadership and Personal Development

Competencies and Suggested Objectives

1. Analyze various definitions of leadership. [DOK2]
  a. Discuss common leadership themes.
    • Autocratic
    • Democratic
    • Laissez-faire
  b. Compare and contrast leadership styles of influential people throughout history.
  c. Evaluate myths about leaders and leadership.
  d. Compare and contrast leadership operations of local, state, and national government agencies.
  e. Identify qualities of a good leader.
    • Integrity
    • Knowledge
    • Courage
    • Tactfulness
    • Enthusiasm
    • Unselfishness
    • Loyalty

2. Explore key aspects of effective personal development. [DOK1]
  a. Determine essential factors of personal growth and development.
    • Time
    • Urgency
    • Priority
    • Daily planning
    • Weekly planning
    • Scheduling
    • Procrastination
    • Organization
    • Self-discipline

3. Identify and establish personal goal-setting criteria. [DOK1]
  a. Identify the rules for establishing a Specific, Measurable, Attainable, Realistic, and Timely (SMART) goal.
  b. Develop personal short- and long-term SMART goals.

4. Examine personality types using various personality and character evaluations. [DOK2]
  a. Discuss how personality types affect personal, professional, and interpersonal development and relationships.
  b. Complete a personality inventory activity (e.g., Myers-Briggs, Clifton Strengths, Real Colors, enneagram, etc.).

Unit 2: Communication Skills

Competencies and Suggested Objectives
1. Define communication. [DOK1] a. Discuss the different types of communication. • Verbal o Articulation o Volume o Inflection o Tone o Pace • Nonverbal o Eye contact o Mannerisms and gestures o Poise o Confidence • Digital o Synchronous o Asynchronous b. Explore the various communication methods used in business.
2. Examine the communication cycle. [DOK2] a. Identify the steps in communication (i.e., send [encodes], receive [decodes], message, feedback, channel, and noise). b. Discuss the characteristics of poor and effective listening skills. • Passive • Active c. Explore common communication barriers.
3. Apply the fundamentals of communication. [DOK3] a. Demonstrate written communication techniques using various applications. • Handwritten (e.g., letters, thank you notes, memos, etc.) • Electronic (e.g., email, slide presentations, etc.)

Unit 3: Professional Presentations

Competencies and Suggested Objectives

1. Identify different types of oral presentations. [DOK1]
    a. Distinguish between the different types of speeches and presentations.
        • Informative (e.g., research)
        • Instructive
        • Demonstrative
        • Persuasive
        • Motivational
        • Special occasion
        • Debate
        • Virtual

2. Identify different ways to enhance a presentation. [DOK1]
    a. Identify the types of tools used to enhance a presentation.
        • Posters
        • Slide presentations
        • Models
        • Sound equipment
        • Podiums/lecterns

3. Determine the appropriate situation for various types of presentations. [DOK1]
    a. Identify the appropriate type of presentation based on a specific audience or purpose.
        • Who?
        • What?
        • When?
        • Where?
        • Why?
        • How?

4. Discuss techniques used to overcome a fear of public speaking. [DOK1]

5. Identify the steps used to prepare a professional presentation. [DOK2]
    a. Discuss and apply the steps necessary to develop a professional presentation.
        • Topic selection
        • Brainstorming
        • Research
        • Outlining
        • Rough drafts
        • Final draft

6. Create a research-based presentation or speech. [DOK 2]

Unit 4: Social Media

Competencies and Suggested Objectives

1. Establish the impact of a positive and negative social media presence. [DOK3]
     a. Investigate personal social media image.
     b. Identify one's existing social media presence.
     c. Assess, improve, and maintain a personal social media presence.

2. Identify appropriate uses of social media. [DOK2]
     a. Compare and contrast social media policies.
         • School or district (e.g., photo releases, personal accounts, etc.)
         • Student organizations (e.g., local, state, and national)
         • Social media platforms
         • Industry
     b. Determine appropriate social media strategies for engaging with various audiences.
         • Post scheduling
         • Language
         • Content
     c. Review policies and guidelines for personal internet safety.
         • Cyberbullying
         • Phishing
         • Explicit content
     d. Determine ways to verify the authenticity of information posted online.

3. Determine how social media impacts professional environments. [DOK2]
     a. Identify scenarios where social media has a positive or negative impact.
         • Employment
         • Morale
         • Recruitment
         • Content sensitivity
         • Reputation
         • Conflict
         • Potential consequences (prior or during employment)

Unit 5: Team Building and Conflict Management

Competencies and Suggested Objectives

1. Define the stages of working with a team. [DOK1]
   a. Forming—The team is established and develops ground rules and expectations.
   b. Storming—Members communicate their thoughts and opinions without control by group leaders.
   c. Norming—Members feel part of the team and can achieve goals by working together.
   d. Performing—The team works in an open and trusting environment with flexibility.
   e. Adjourning—The team assesses the project and implements a plan for transition.

2. Define interpersonal relationships and associated terminology. [DOK2]
   a. Discuss interpersonal relationships in customer service, business relationships, and employee-employer relationships.
   b. Discuss diversity issues that can impact interpersonal relationships.
   c. Examine discrimination and other negative actions or attitudes that can impact interpersonal relationships.
   d. Demonstrate techniques to combat bullying.

3. Demonstrate interpersonal skills that contribute to positive work relationships. [DOK2]
   a. Identify the characteristics and benefits of positive work relationships.
   b. Discuss the concept of teamwork in the workplace.
   c. Demonstrate teamwork skills in problem-solving.
   d. Develop the skills needed to maintain effective working relationships.

4. Demonstrate the use of proper procedures for solving conflicts with coworkers, supervisors, and/or customers. [DOK2]
   a. Demonstrate problem-solving and negotiation skills.
   b. Explore conflict management skills.

5. Demonstrate the dynamics of team building. [DOK2]
   a. Conduct a small-group team building activity.
     • Plan and conduct a chapter meeting or activity.
     • Agricultural Sales Career Development Event (CDE)
     • Marketing Plan CDE
   b. Conduct a large-group team building activity.
     • Organize and conduct a class community service project.
     • Develop a Program of Activities (POA).
     • Develop a fundraising plan.

Unit 6: Workplace Essentials

Competencies and Suggested Objectives

1. Research career opportunities and employment skills. [DOK2]
   a. Create an application letter, a résumé, a follow-up letter, and a letter of resignation.
   b. Demonstrate appropriate interview skills for face-to-face and phone interviews.
   c. Discuss the importance of career opportunities and advancement.

2. Demonstrate appropriate workplace ethics. [DOK2]
   a. Critique the behavior of professionals to determine whether their actions and decisions are ethical.
   b. Discuss privacy issues and safeguarding information in leadership roles and professional settings.
   c. Explain sexual harassment and a hostile work environment.
   d. Discuss workplace behavior and the legal ramifications of unethical behavior.
   e. Explain the employee's role in ethical use of business property.
   f. Discuss the role of ethics in business operations.
   g. Examine pay and advancement differences based on personal development criteria.
   h. Investigate the role of the human resources department in the work environment.

3. Demonstrate appropriate professional etiquette skills. [DOK2]
   a. Demonstrate appropriate greetings and introductions.
   b. Demonstrate appropriate table etiquette in a business setting.
   c. Demonstrate appropriate professional dress for interviews and the workplace.
   d. Discuss personal hygiene and professional behavior.

Enrichment
1. Ask a local human resources representative to speak to the class about the rules and regulations in the work environment.

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Unit 7: Immersion Into FFA and Supervised Agricultural Experience (SAE) for All

Competencies and Suggested Scenarios

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 (LDEs)
            ○ Prepared Public Speaking
            ○ Extemporaneous Speaking
            ○ Creed Speaking
            ○ Employment Skills
            ○ Agricultural Issues Forum
        • Career Development Events (CDEs)
            ○ Agricultural Sales
            ○ Marketing Plan
            ○ Agricultural Communications
        • Leadership retreats or conferences
        • Industry-related seminars, workshops, or conferences
        • Other related FFA activities

2. Apply concepts learned from the school-based agricultural education program to continue the progression of immersion SAEs. [DOK 4]
 	
    a. Redefine and adjust requirements of agreements between the student, parents, supervisor, and/or employer.
    b. Update SAE records using an electronic/computer-based system of record keeping.
 	
        • 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
    c. Complete degree and proficiency award applications as they apply to the SAE.

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: Introduction to Leadership and Personal Development		
	1.	Analyze various definitions of leadership.
	2.	Explore key aspects of effective personal development.
	3.	Identify and establish personal goal-setting criteria.
	4.	Examine personality types using various personality and character evaluations.
Unit 2: Communication Skills		
	1.	Define communication.
	2.	Examine the communication cycle.
	3.	Apply the fundamentals of communication.
Unit 3: Professional Presentations		
	1.	Identify different types of oral presentations.
	2.	Identify different ways to enhance a presentation.
	3.	Determine the appropriate situation for various types of presentations.
	4.	Discuss techniques used to overcome a fear of public speaking.
	5.	Identify the steps used to prepare a professional presentation.
	6.	Create a research-based presentation or speech.
Unit 4: Social Media		
	1.	Establish the impact of a positive and negative social media presence.
	2.	Identify appropriate uses of social media.
	3.	Determine how social media impacts professional environments.
Unit 5: Team Building and Conflict Management		
	1.	Define the stages of working with a team.
	2.	Define interpersonal relationships and associated terminology.
	3.	Demonstrate interpersonal skills that contribute to positive work relationships.

	4.	Demonstrate the use of proper procedures for solving conflicts with coworkers, supervisors, and/or customers.
	5.	Demonstrate the dynamics of team building.
Unit 6: Workplace Essentials		
	1.	Research career opportunities and employment skills.
	2.	Demonstrate appropriate workplace ethics.
	3.	Demonstrate appropriate professional etiquette skills.
Unit 7: Immersion Into FFA and Supervised Agricultural 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 school-based agricultural education program to continue the progression of immersion SAEs. DOK 4

Appendix: Industry Standards

Framework for AFNR Content Standards and Performance Elements Crosswalk for Agricultural Leadership								
	Unit	1	2	3	4	5	6	7
AFNR								
ABS- Agribusiness Systems			X				X	X
AS- Animal Systems								
BS- Biotechnology								
CRP- Career Ready Practices		X	X	X	X	X	X	X
CS- AFNR Cluster Skill		X	X	X	X	X	X	X
ES- Environmental Service Systems								
FPP- Food Products and Processing Systems								
NRS- Natural Resource Systems								
PS- Plant Systems								
PST- Power, Structural, and Technical Systems								

AFNR Pathway
Content Standards and Performance Elements

The AFNR Pathway Content Standards and Performance Elements are adapted from *National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards.* Reprinted with permission from the National Council for Agricultural Education, 1410 King St., Suite 400, Alexandria, VA 22314, 800.772.0939. Copyright © 2015. A complete copy of the national standards can be downloaded from the Team Ag Ed Learning Center at thecouncil.ffa.org/afnr

ABS   AGRIBUSINESS SYSTEMS
AS   ANIMAL SYSTEMS
BS   BIOTECHNOLOGY
CRP   CAREER READY PRACTICES
CS   AGRICULTURE FOOD AND NATURAL RESOURCES CLUSTER SKILL
ES   ENVIRONMENTAL SERVICE SYSTEMS
FPP   FOOD PRODUCTS AND PROCESSING SYSTEMS
NRS   NATURAL RESOURCE SYSTEMS
PS   PLANT SYSTEMS
PST   POWER, STRUCTURAL, AND TECHNICAL SYSTEMS

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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.

Within each pathway, the standards are organized as follows:

- *Common Career Technical Core (CCTC) Standards* – These are the standards for Agribusiness Systems (AG-ABS) 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.01. CCTC Standard: Apply management planning principles in AFNR businesses.
> **ABS.01.01. Performance Indicator:** Apply micro- and macroeconomic principles to plan and manage inputs and outputs in an AFNR business.
> **ABS.01.02. Performance Indicator:** Read, interpret, evaluate and write statements of purpose to guide business goals, objectives and resource allocation.
> **ABS.01.03. Performance Indicator:** Devise and apply management skills to organize and run an AFNR business in an efficient, legal and ethical manner.
> **ABS.01.04. Performance Indicator:** 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.
> **ABS.02.01. Performance Indicator:** 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.).
> **ABS.02.02. Performance Indicator:** 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.
> **ABS.03.01. Performance Indicator:** Develop, assess and manage cash budgets to achieve AFNR business goals.

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ABS.03.02. Performance Indicator: Analyze credit needs and manage credit budgets to achieve AFNR business goals.

ABS.04. CCTC Standard: Develop a business plan for an AFNR business.
    ABS.04.01. Performance Indicator: Analyze characteristics and planning requirements associated with developing business plans for different types of AFNR businesses.
    ABS.04.02. Performance Indicator: Develop production and operational plans for an AFNR business.
    ABS.04.03. Performance Indicator: Identify and apply strategies to manage or mitigate risk.

ABS.05. CCTC Standard: Use sales and marketing principles to accomplish AFNR business objectives.
    ABS.05.01. Performance Indicator: Analyze the role of markets, trade, competition and price in relation to an AFNR business sales and marketing plans.
    ABS.05.02. Performance Indicator: Assess and apply sales principles and skills to accomplish AFNR business objectives.
    ABS.05.03. Performance Indicator: Assess marketing principles and develop marketing plans to accomplish AFNR business objectives.

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.

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.

AS.01. CCTC Standard: Analyze historic and current trends impacting the animal systems industry.
    AS.01.01. Performance Indicator: Evaluate the development and implications of animal origin, domestication and distribution on production practices and the environment.
    AS.01.02. Performance Indicator: Assess and select animal production methods for use in animal systems based upon their effectiveness and impacts.

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AS.01.03. Performance Indicator: 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.
    AS.02.01. Performance Indicator: Demonstrate management techniques that ensure animal welfare.
    AS.02.02. Performance Indicator: 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.
    AS.03.01. Performance Indicator: Analyze the nutritional needs of animals.
    AS.03.02 Performance Indicator: Analyze feed rations and assess if they meet the nutritional needs of animals.
    AS.03.03 Performance Indicator: 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.
    AS.04.01. Performance Indicator: Evaluate animals for breeding readiness and soundness.
    AS.04.02. Performance Indicator: Apply scientific principles to select and care for breeding animals.
    AS.04.03 Performance Indicator: 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.
    AS.05.01. Performance Indicator: Design animal housing, equipment and handling facilities for the major systems of animal production.
    AS.05.02. Performance Indicator: 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.
    AS.06.01. Performance Indicator: Classify animals according to taxonomic classification systems and use (e.g. agricultural, companion, etc.).
    AS.06.02. Performance Indicator: Apply principles of comparative anatomy and physiology to uses within various animal systems.
    AS.06.03. Performance Indicator: 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.
    AS.07.01. Performance Indicator: Design programs to prevent animal diseases, parasites and other disorders and ensure animal welfare.

AS.07.02. Performance Indicator: 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.
  AS.08.01. Performance Indicator: Design and implement methods to reduce the effects of animal production on the environment.
  AS.08.02. Performance Indicator: Evaluate the effects of environmental conditions on animals and create plans to ensure favorable environments for animals.

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.).

DEFINITIONS: Within each pathway, the standards are organized as follows:
- *Common Career Technical Core (CCTC) Standards* – These are the standards for CRPs 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 CTE program of study.

CRP.01. CCTC Standard: Act as a responsible and contributing citizen and employee.
  CRP.01.01. Performance Indicator: Model personal responsibility in the workplace and community.
  CRP.01.02 Performance Indicator: Evaluate and consider the near-term and long-term impacts of personal and professional decisions on employers and community before taking action.
  CRP.01.03. Performance Indicator: 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.
  CRP.02.01. Performance Indicator: Use strategic thinking to connect and apply academic learning, knowledge and skills to solve problems in the workplace and community.

CRP.02.02. Performance Indicator: 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.
    CRP.03.01. Performance Indicator: Design and implement a personal wellness plan.
    CRP.03.02. Performance Indicator: Design and implement a personal financial management plan.

CRP.04. CCTC Standard: Communicate clearly, effectively and with reason.
    CRP.04.01. Performance Indicator: Speak using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.
    CRP.04.02. Performance Indicator: Produce clear, reasoned and coherent written and visual communication in formal and informal settings.
    CRP.04.03. Performance Indicator: 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.
    CRP.05.01. Performance Indicator: Assess, identify and synthesize the information and resources needed to make decisions that positively impact the workplace and community.
    CRP.05.02. Performance Indicator: 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.
    CRP.06.01. Performance Indicator: Synthesize information, knowledge and experience to generate original ideas and challenge assumptions in the workplace and community.
    CRP.06.02. Performance Indicator: Assess a variety of workplace and community situations to identify ways to add value and improve the efficiency of processes and procedures.
    CRP.06.03. Performance Indicator: 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.
    CRP.07.01. Performance Indicator: Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.
    CRP.07.02. Performance Indicator: 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.
    CRP.08.01. Performance Indicator: Apply reason and logic to evaluate workplace and community situations from multiple perspectives.

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CRP.08.02. Performance Indicator: Investigate, prioritize and select solutions to solve problems in the workplace and community.

CRP.08.03. Performance Indicator: Establish plans to solve workplace and community problems and execute them with resiliency.

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

CRP.09.01. Performance Indicator: Model characteristics of ethical and effective leaders in the workplace and community (e.g. integrity, self-awareness, self-regulation, etc.).

CRP.09.02. Performance Indicator: Implement personal management skills to function effectively and efficiently in the workplace (e.g., time management, planning, prioritizing, etc.).

CRP.09.03. Performance Indicator: 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.

CRP.10.01. Performance Indicator: Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.

CRP.10.02. Performance Indicator: Examine career advancement requirements (e.g., education, certification, training, etc.) and create goals for continuous growth in a chosen career.

CRP.10.03. Performance Indicator: 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.

CRP.10.04. Performance Indicator: 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.

CRP.11.01. Performance Indicator: Research, select and use new technologies, tools and applications to maximize productivity in the workplace and community.

CRP.11.02. Performance Indicator: 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.

CRP.12.01. Performance Indicator: Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.

CRP.12.02. Performance Indicator: 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.).

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.

Within each pathway, the standards are organized as follows:

- **Common Career Technical Core (CCTC) Standards** – These are the standards for Agriculture, Food and Natural Resources Career Cluster® (AG) 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.

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

> **CS.01.01. Performance Indicator:** Research, examine and discuss issues and trends that impact AFNR systems on local, state, national and global levels.
> **CS.01.02. Performance Indicator:** Examine technologies and analyze their impact on AFNR systems.
> **CS.01.03. Performance Indicator:** 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.

> **CS.02.01. Performance Indicator:** Research and use geographic and economic data to solve problems in AFNR systems.
> **CS.02.02. Performance Indicator:** 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.

> **CS.03.01. Performance Indicator:** Identify and explain the implications of required regulations to maintain and improve safety, health and environmental management systems.
> **CS.03.02. Performance Indicator:** Develop and implement a plan to maintain and improve health, safety and environmental compliance and performance.
> **CS.03.03. Performance Indicator:** Apply health and safety practices to AFNR workplaces.
> **CS.03.04. Performance Indicator:** 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.
    CS.04.01. Performance Indicator: Identify and implement practices to steward natural resources in different AFNR systems.
    CS.04.02. Performance Indicator: 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.
    CS.05.01. Performance Indicator: 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.
    CS.06.01. Performance Indicator: Examine and explain foundational cycles and systems of AFNR.
    CS.06.02. Performance Indicator: Analyze and explain the connection and relationships between different AFNR systems on a national and global level.

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.

Within each pathway, the standards are organized as follows:

- *National Council for Agricultural Education (NCAE) Standard** – These are the standards set forth by the National Council for Agricultural Education for Biotechnology Systems. They define what students should know and be able to do after completing instruction in a program of study focused on applying biotechnology to AFNR systems.
- *Performance Indicators* – These statements distill each performance element 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 performance element at the conclusion of a program of study in this area.

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.).
    BS.01.01. **Performance Indicator**: 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.).

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BS.01.02. Performance Indicator: 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.).

BS.01.03. Performance Indicator: 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.).

BS.02.01. **Performance Indicator**: Read, document, evaluate and secure accurate laboratory records of experimental protocols, observations and results.

BS.02.02. Performance Indicator: Implement standard operating procedures for the proper maintenance, use and sterilization of equipment in a laboratory.

BS.02.03. Performance Indicator: Apply standard operating procedures for the safe handling of biological and chemical materials in a laboratory.

BS.02.04. Performance Indicator: Safely manage and dispose of biological materials, chemicals and wastes according to standard operating procedures.

BS.02.05. Performance Indicator: 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.).

BS.03.01. Performance Indicator: Apply biotechnology principles, techniques and processes to create transgenic species through genetic engineering.

BS.03.02. Performance Indicator: Apply biotechnology principles, techniques and processes to enhance the production of food through the use of microorganisms and enzymes.

BS.03.03. Performance Indicator: Apply biotechnology principles, techniques and processes to protect the environment and maximize use of natural resources (e.g., biomass, bioprospecting, industrial biotechnology, etc.).

BS.03.04. Performance Indicator: Apply biotechnology principles, techniques and processes to enhance plant and animal care and production (e.g., selective breeding, pharmaceuticals, biodiversity, etc.).

BS.03.05. Performance Indicator: Apply biotechnology principles, techniques and processes to produce biofuels (e.g., fermentation, transesterification, methanogenesis, etc.).

BS.03.06. Performance Indicator: Apply biotechnology principles, techniques and processes to improve waste management (e.g., genetically modified organisms, bioremediation, etc.).

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.

Within each pathway, the standards are organized as follows:

- ***Common Career Technical Core (CCTC) Standards*** – These are the standards for Environmental Service Systems (AG-ESS) 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.

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

    ESS.01.01. Performance Indicator: Analyze and interpret laboratory and field samples in environmental service systems.

    ESS.01.02. Performance Indicator: 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.

    ESS.02.01. Performance Indicator: Interpret and evaluate the impact of laws, agencies, policies and practices affecting environmental service systems.

    ESS.02.02. Performance Indicator: Compare and contrast the impact of current trends on regulation of environmental service systems (e.g., climate change, population growth, international trade, etc.).

    ESS.02.03. Performance Indicator: 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.

    ESS.03.01. Performance Indicator: Apply meteorology principles to environmental service systems.

    ESS.03.02. Performance Indicator: Apply soil science and hydrology principles to environmental service systems.

    ESS.03.03. Performance Indicator: Apply chemistry principles to environmental service systems.

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ESS.03.04. Performance Indicator: Apply microbiology principles to environmental service systems.

ESS.03.05. Performance Indicator: 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).

ESS.04.01. Performance Indicator: Use pollution control measures to maintain a safe facility and environment.

ESS.04.02. Performance Indicator: Manage safe disposal of all categories of solid waste in environmental service systems.

ESS.04.03. Performance Indicator: Apply techniques to ensure a safe supply of drinking water and adequate treatment of wastewater according to applicable rules and regulations.

ESS.04.04. Performance Indicator: 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.

ESS.05.01. Performance Indicator: Use technological and mathematical tools to map land, facilities and infrastructure for environmental service systems.

ESS.05.02. Performance Indicator: Perform assessments of environmental conditions using equipment, machinery and technology.

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.

Within each pathway, the standards are organized as follows:
- *Common Career Technical Core (CCTC) Standards* – These are the standards for Food Products and Processing Systems (AG-FPP) 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.

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

    FPP.01.01. Performance Indicator: Analyze and manage operational and safety procedures in food products and processing facilities.

    FPP.01.02. Performance Indicator: Apply food safety and sanitation procedures in the handling and processing of food products to ensure food quality.

    FPP.01.03. Performance Indicator: 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.

    FPP.02.01. Performance Indicator: 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.

    FPP.02.02. Performance Indicator: 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.

    FPP.02.03. Performance Indicator: 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.

    FPP.03.01. Performance Indicator: Implement selection, evaluation and inspection techniques to ensure safe and quality food products.

    FPP.03.02. Performance Indicator: Design and apply techniques of food processing, preservation, packaging and presentation for distribution and consumption of food products.

    FPP.03.03. Performance Indicator: 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.

    FPP.04.01. Performance Indicator: Examine the scope of the food industry by evaluating local and global policies, trends and customs for food production.

    FPP.04.02. Performance Indicator: Evaluate the significance and implications of changes and trends in the food products and processing industry in the local and global food systems.

    FPP.04.03. Performance Indicator: Identify and explain the purpose of industry organizations, groups and regulatory agencies that influence the local and global food systems.

Natural Resource Systems Career Pathway Content Standards

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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.

Within each pathway, the standards are organized as follows:
- ***Common Career Technical Core (CCTC) Standards*** – These are the standards for Natural Resource Systems (AG-NRS) 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.

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.
> **NRS.01.01. Performance Indicator:** Apply methods of classification to examine natural resource availability and ecosystem function in a particular region.
> **NRS.01.02. Performance Indicator:** Classify different types of natural resources in order to enable protection, conservation, enhancement and management in a particular geographical region.
> **NRS.01.03. Performance Indicator:** Apply ecological concepts and principles to atmospheric natural resource systems.
> **NRS.01.04. Performance Indicator:** Apply ecological concepts and principles to aquatic natural resource systems.
> **NRS.01.05. Performance Indicator:** Apply ecological concepts and principles to terrestrial natural resource systems.
> **NRS.01.06. Performance Indicator:** Apply ecological concepts and principles to living organisms in natural resource systems.

NRS.02. CCTC Standard: Analyze the interrelationships between natural resources and humans.
> **NRS.02.01. Performance Indicator:** 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.).
> **NRS.02.02. Performance Indicator:** Assess the impact of human activities on the availability of natural resources.
> **NRS.02.03. Performance Indicator**: Analyze how modern perceptions of natural resource management, protection, enhancement and improvement change and develop over time.

NRS.02.04. Performance Indicator: Examine and explain how economics affects the use of natural resources.

NRS.02.05. Performance Indicator: 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.

NRS.03.01. Performance Indicator: 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.).

NRS.03.02. Performance Indicator: 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.

NRS.04.01. Performance Indicator: Demonstrate natural resource protection, maintenance, enhancement and improvement techniques.

NRS.04.02. Performance Indicator: Diagnose plant and wildlife diseases and follow protocols to prevent their spread.

NRS.04.03. Performance Indicator: Prevent or manage introduction of ecologically harmful species in a particular region.

NRS.04.04. Performance Indicator: Manage fires in natural resource systems.

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.

Within each pathway, the standards are organized as follows:
- *Common Career Technical Core (CCTC) Standards* – These are the standards for Plant Systems (AG-PS) 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.

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

PS.01.01. Performance Indicator: Determine the influence of environmental factors on plant growth.

PS.01.02. Performance Indicator: Prepare and manage growing media for use in plant systems.

PS.01.03. Performance Indicator: 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.

PS.02.01. Performance Indicator: Classify plants according to taxonomic systems.

PS.02.02. Performance Indicator: Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.

PS.02.03. Performance Indicator: 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.

PS.03.01. Performance Indicator: Demonstrate plant propagation techniques in plant system activities.

PS.03.02. Performance Indicator: Develop and implement a management plan for plant production.

PS.03.03. Performance Indicator: Develop and implement a plan for integrated pest management for plant production.

PS.03.04. Performance Indicator: Apply principles and practices of sustainable agriculture to plant production.

PS.03.05. Performance Indicator: 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).

PS.04.01. Performance Indicator: Evaluating, identifying and preparing plants to enhance an environment.

PS.04.02. Performance Indicator: Create designs using plants.

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.

Within each pathway, the standards are organized as follows:
- ***Common Career Technical Core (CCTC) Standards*** – These are the standards for Power, Structural and Technical Systems (AG-PST) 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.

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

    PST.01.01. Performance Indicator: Apply physical science and engineering principles to assess and select energy sources for AFNR power, structural and technical systems.

    PST.01.02. Performance Indicator: Apply physical science and engineering principles to design, implement and improve safe and efficient mechanical systems in AFNR situations.

    PST.01.03. Performance Indicator: 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.

    PST.02.01. Performance Indicator: Perform preventative maintenance and scheduled service to maintain equipment, machinery and power units used in AFNR settings.

    PST.02.02. Performance Indicator: 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.

    PST.03.01. Performance Indicator: Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.

    PST.03.02. Performance Indicator: Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.

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PST.03.03. Performance Indicator: 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.
  PST.04.01. Performance Indicator: Create sketches and plans for AFNR structures.
  PST.04.02. Performance Indicator: Determine structural requirements, specifications and estimate costs for AFNR structures
  PST.04.03. Performance Indicator: 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.).

  PST.04.04. Performance Indicator: 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.
  PST.05.01. Performance Indicator: Apply computer and other technologies (e.g., robotics, CNC, UAS, etc.) to solve problems and increase the efficiency of AFNR systems.
  PST.05.02. Performance Indicator: Prepare and/or use electrical drawings to design, install and troubleshoot electronic control systems in AFNR settings.
  PST.05.03. Performance Indicator: Apply geospatial technologies to solve problems and increase the efficiency of AFNR systems.

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