WISCONSIN STANDARDS FOR

Agriculture, Food, and Natural Resources

Wisconsin Department of Public Instruction
Jill K. Underly, PhD, State Superintendent

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Foreword

In Spring 2024, I formally adopted the Wisconsin Standards for Agriculture, Food, and Natural Resources. This revised set of academic standards provides a foundational framework that identifies what students should know and be able to do in Agriculture, Food, and Natural Resources.

The standards are a result of a concerted effort led by Wisconsin educators and partners who shared their expertise in Agriculture, Food, and Natural Resources and teaching from kindergarten through higher education. The public and the Wisconsin Legislature provided feedback for the writing committee to consider throughout Wisconsin's academic standards review and revision process.

Agriculture, Food, and Natural Resources is an essential part of a comprehensive PK-12 education for all students and gives Wisconsin students a way to understand and empower themselves and their worlds. The knowledge, skills, and habits of mind gained through Agriculture, Food, and Natural Resources education in Wisconsin schools support the Wisconsin Department of Public Instruction's vision of engaged learners creating a better Wisconsin together. Wisconsin's 2024 standards for Agriculture, Food, and Natural Resources also result in the following:

- Wisconsin students develop deep understandings as curious and capable learners, so they may experience joy and confidence in themselves.
- Wisconsin students develop proven practices and content.
- Wisconsin's students are flexible and use the standards to understand the world and question and critique the world productively.
- Wisconsin's students have expanded professional opportunities in a wide variety of careers.

The Wisconsin Department of Public Instruction will continue to build on this work to support implementation of the standards with resources for the field. I am excited to share the Wisconsin Standards for Agriculture, Food, and Natural Resources, which aims to build skills, knowledge, and engagement opportunities for all Wisconsin students.

Jill K. Underly, Ph.D., State Superintendent

Acknowledgements

The Wisconsin Department of Public Instruction (DPI) wishes to acknowledge the ongoing work, commitment, and various contributions of individuals to revise our state's academic standards for Agriculture, Food, and Natural Resources. Thank you to the State Superintendent's Academic Standards Review Council for their work and guidance through the standards process. A special thanks to the Agriculture, Food, and Natural Resources writers and reviewers for taking on this important project that will shape the classrooms of today and tomorrow. We also wish to thank the many subject matter experts who gave their time to review the draft standards. Your expertise is greatly appreciated. Thanks to the many staff members across the division and other teams at DPI who have contributed to this project. Finally, a special thanks to Wisconsin educators, businesspeople, parents, and citizens who provided comment and feedback to drafts of these standards.

Wisconsin Standards for Agriculture, Food, and Natural Resources

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Section I

Wisconsin's Approach to Academic Standards

Purpose of the Document

The purpose of this document is to improve Agriculture, Food, and Natural Resources education for students and for communities. The Wisconsin Department of Public Instruction (DPI) has developed standards to assist Wisconsin educators and community members in understanding, developing, and implementing course offerings and curriculum in school districts across Wisconsin.

This publication provides a vision for student success and follows *The Guiding Principles for Teaching and Learning (2011)*. In brief, the principles are:

1. Every student has the right to learn.
2. Instruction must be rigorous and relevant.
3. Purposeful assessment drives instruction and affects learning.
4. Learning is a collaborative responsibility.
5. Students bring strengths and experiences to learning.
6. Responsive environments engage learners.

Program leaders will find these standards valuable for making decisions about:

- Program structure and integration
- Curriculum redesign
- Staffing and staff development
- Scheduling and student grouping
- Facility organization
- Learning spaces and materials development
- Resource allocation and accountability
- Collaborative work with other units of the school, district, and community

What Are Academic Standards?

Wisconsin Academic Standards specify what students should know and be able to do. They serve as goals for teaching and learning. Setting high standards enables students, parents, educators, and citizens to know what students should have learned at a given point in time. In Wisconsin, all state standards serve as a model. Locally elected school boards adopt academic standards in each subject area to best serve their local communities. We must ensure that all children have equal access to high-quality educational programs. Clear statements about what students must know and be able to do are essential in making sure our schools offer opportunities to get the knowledge and skills necessary for success beyond the classroom.

Adopting these standards is voluntary. Districts may use the academic standards as guides for developing local grade-by-grade-level curriculum. Implementing standards may require some school districts to upgrade school and district curricula. This may result in changes in instructional methods and materials, local assessments, and professional development opportunities for the teaching and administrative staff.

What is the Difference Between Academic Standards and Curriculum?

Standards are statements about what students should know and be able to do, what they might be asked to do to give evidence of learning, and how well they should be expected to know or do it. Curriculum is the program devised by local school districts used to prepare students to meet standards. It consists of activities and lessons at each grade level, instructional materials, and various instructional techniques. In short, standards define what is to be learned at certain points in time, and from a broad perspective, what performances will be accepted as evidence that the learning has occurred. Curriculum specifies the details of the day-to-day schooling at the local level.

Developing the Academic Standards

DPI has a transparent and comprehensive process for reviewing and revising academic standards. The process begins with a notice of intent to review an academic area with a public comment period. The State Superintendent's Academic Standards Review Council examines those comments and may recommend revision or development of standards in that academic area. The state superintendent authorizes whether or not to pursue a revision or development process. Following this, a state writing committee is formed to work on those standards for all grade levels. That draft is then made available for open review to get feedback from the public, key stakeholders, educators, and the legislature with further review by the State Superintendent's Academic Standards Review Council. The state superintendent then determines adoption of the standards.

Aligning for Student Success

To build and sustain schools that support every student in achieving success, educators must work together with caregivers, community members, and business partners to connect the most promising practices in the most meaningful contexts. The release of the *Wisconsin Standards for Agriculture, Food, and Natural Resources* provides a set of important academic standards for school districts to implement. This is connected to a larger vision of engaged learners creating a better Wisconsin together. Academic standards work together with other critical principles and efforts to educate every child to be an engaged learner capable of creating a better Wisconsin together. Here, the vision and Guiding Principles form the foundation for building a supportive process for teaching and learning rigorous and relevant content. The following sections articulate this integrated approach to increasing student success in Wisconsin schools and communities.

Relating the Academic Standards to All Students

Academic standards should allow ALL students to engage, access, and be assessed in ways that fit their strengths, needs, and interests. This applies to students with individualized education plans (IEPs), English learners, and gifted and talented pupils, consistent with all other students. Academic standards serve as a foundation for individualized programming decisions for all students.

Academic standards serve as a valuable basis for establishing concrete, meaningful goals for each student's developmental progress and demonstration of proficiency. Students with IEPs must be provided specially designed instruction that meets their individual needs. It is expected that each individual student with an IEP will require unique services and supports matched to their strengths and needs in order to close achievement gaps in grade-level standards. Alternate standards are only available for students with the most significant cognitive disabilities.

Gifted and talented students may achieve well beyond the academic standards and move into advanced grade levels or into advanced coursework.

Our Vision: Engaged Learners Creating a Better Wisconsin Together

We are committed to ensuring every child graduates from high school academically prepared and socially and emotionally competent. A successful Wisconsin student is proficient in academic content and can apply their knowledge through skills such as critical thinking, communication, collaboration, and creativity. The successful student will also possess critical habits such as perseverance, responsibility, adaptability, and leadership. This vision for every child as an engaged learner guides our beliefs and approaches to education and to creating a better Wisconsin together.

Guided by Principles

All educational initiatives are guided and impacted by important and often unstated attitudes or principles for teaching and learning. *The Guiding Principles for Teaching and Learning (2011)* were drawn from research and provide the touchstone for practices that truly affect the vision of "Engaged learners creating a better Wisconsin together." When made transparent, these principles inform what happens in the classroom, direct the implementation and evaluation of programs, and most importantly, remind us of our own beliefs and expectations for students.

Engaging Learners Through Career Readiness

When educators connect their students' learning to future career opportunities, they begin to engage students in a very personal and powerful way. In addition to career readiness as a strategy to engage learners, it is also a conduit through which every student in Wisconsin, including students with an IEP, can graduate from high school with the knowledge, skills, and abilities needed to be successful in their chosen career pathway. Regardless of the postsecondary path that a graduate pursues immediately after their K-12 education, we believe in preparing all students to be lifelong learners and acknowledge that one's education and career path are inextricably linked.

The Wisconsin Career Readiness Standards (WCRS) provide the framework for educators to integrate career-readiness skills across all disciplines and at every grade level from K-12. Because people begin to develop interests and biases at an early age, it is important to start integrating WCRS in the elementary grades. By middle school, students may have already developed beliefs about their abilities related to careers. In addition, they may have formed stereotypes about which careers are appropriate for a particular gender, race, or socioeconomic background. Exposing students to careers and helping them develop skills related to careers when they are young is one way to keep students' minds open to all possibilities.

Implementing the Wisconsin Career Readiness Standards may look different for every teacher, every program, every course, and potentially every unit or lesson. These standards were designed to be naturally and intentionally integrated into other discipline standards. The Wisconsin Career Readiness Standards can be found here:

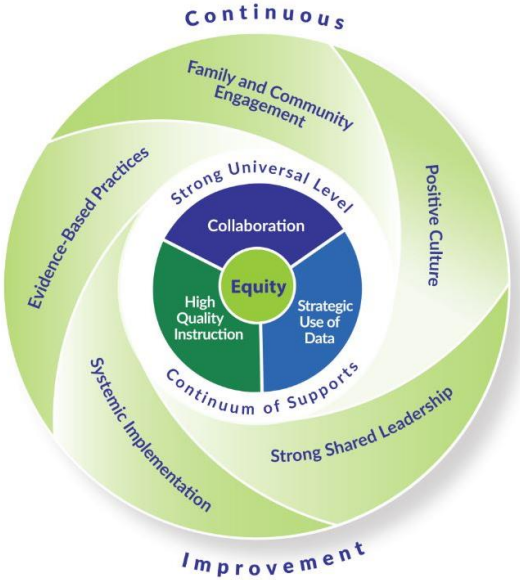
Ensuring a Process for Student Success

For Wisconsin schools and districts, implementing the *Framework for Equitable Multi-Level Systems of Supports (2017)* means providing equitable services, practices, and resources to every learner based upon responsiveness to effective instruction and intervention. In this system, high-quality instruction, strategic use of data, and collaboration interact within a continuum of supports to facilitate learner success. Schools provide varying types of supports with differing levels of intensity to proactively

and responsibly adjust to the needs of the whole child. These include the knowledge, skills, and habits learners need for success beyond high school, including developmental, academic, behavioral, social, and emotional skills.

Connecting to Content: Wisconsin Academic Standards

Within this vision for increased student success, rigorous, internationally benchmarked academic standards provide the content for high-quality curriculum and instruction and for a strategic assessment system aligned to those standards. With the adoption of the standards, Wisconsin has the tools to design curriculum, instruction, and assessments to maximize student learning. The standards articulate what we teach so that educators can focus on how instruction can best meet the needs of each student. When implemented within an equitable multilevel system of supports, the standards can help to ensure that every child will graduate prepared for college and career.



Section II

Wisconsin Standards for Agriculture, Food, and Natural Resources

Agriculture, Food, and Natural Resources is a Part of Career and Technical Education

The standards outlined in this document provide an important foundation to prepare individuals for a wide range of careers in Agriculture, Food, and Natural Resources (AFNR). AFNR is part of a larger system referred to as career and technical education (CTE). CTE in Wisconsin is both a collection of educational programs or disciplines as well as a system of preparing students for college, career, community, and life. CTE programs are delivered primarily through six specific disciplines. These include:

- Agriculture, Food, and Natural Resources
- Business and Information Technology
- Family and Consumer Sciences
- Health Science
- Marketing, Management, and Entrepreneurship
- Technology and Engineering

A National Vision for CTE

The National Association of State Directors of Career and Technical Education has developed a bold vision for CTE titled *"Without Limits: A Shared Vision for the Future of Career Technical Education"* (CTE Without Limits). This vision lays out a cohesive, flexible, and responsive career preparation ecosystem designed to close equity gaps in educational outcomes and workforce readiness, and leverage CTE as a catalyst for ensuring each learner can reach success in the career of their choice. Wisconsin supports the five interconnected and equally critical principles:

- Each learner engages in a cohesive, flexible, and responsive career preparation ecosystem.
- Each learner feels welcome, is supported, and has the means to succeed in the career preparation ecosystem.
- Each learner skillfully navigates their own career journey.
- Each learner's skills are counted, valued, and portable.
- Each learner can access CTE without borders. In other words, as learners become increasingly mobile and not place-based, and as more learning and work happens remotely, geographic barriers that limit access and opportunities for learners, particularly those in rural communities, need to be removed.

Wisconsin's Vision for Career and Technical Education

The Wisconsin vision for career and technical education (CTE) is shaped by Wisconsin practitioners, experts, and the business community, and is informed by work at the national level and in other states. The overarching goal of Wisconsin's vision for CTE is for students to see themselves as confident doers and learners in a career pathway, supporting the department's vision to be engaged learners fully prepared to create a better Wisconsin together.

Building a Foundation of Career Readiness

As noted in Section I, the Wisconsin Career Readiness Standards (WCRS) capture the knowledge, skills, and abilities that students need to be successful in their chosen career pathway and will lead to workplace success. Because career and technical education (CTE) prepares all students for their future career, education, and ultimately life success, the WCRS are a natural fit for any CTE course. Educators will find many of the WCRS embedded in the AFNR standards. Here is an example of what WCRS looks like in AFNR:

Wisconsin Career Readiness Standards	Wisconsin Agriculture, Food, and Natural Resources Standards
Career Ready (CAR) **WCRS.CAR.2.A:** Identify the in-demand career and entrepreneurship opportunities that align with personal interests, skills, and work values.	**Agriculture Leadership, Literacy and Research (ALLR)** **AFNR.ALLR.5.B.b.1:** Research and describe careers in each of the AFNR pathways, and choose potential careers connecting to personal interests and skills.
Learning Ready (LRN) **WCRS.LRN.2.A:** Find and use unbiased, rational information to defend ideas and make decisions.	**Animal Science (AS)** **AFNR.AS.8.B.i.1:** Critique reliability and validity of evidence regarding effects of environmental conditions on animal populations and performance.

Life Ready (LIF)	Power, Structure, and Mechanical Technology (PSMT)
WCRS.LIF.2.B: Communicate and collaborate effectively with others, using various modes of communication, across languages, cultures, and contexts.	**AFNR.PSMT.1.G:** Communicate and work effectively in power, structural, and mechanical technology settings with individuals and groups representing diverse backgrounds and abilities.

CTE in the Elementary Grades

Another way to build the foundation for career readiness is to expose students to career and technical education in the elementary grades. We encourage elementary educators to intentionally weave appropriate CTE standards into subject areas such as math, science, social studies, and English. Educators will be able to learn more about how to implement the Wisconsin Career Readiness and other CTE standards in elementary grades in a future publication, "Wisconsin's Guide to K-5 Career Readiness."

Agriculture, Food, and Natural Resources (AFNR) has a presence at the elementary grade levels, especially related to agricultural literacy and food production. Knowledge and skills in these areas are woven throughout the elementary curriculum. AFNR teachers in districts are an excellent resource to assist in the development of curriculum and activities. Teachers can effectively use CTE concepts in instruction and activities to develop foundational skills and also create a connection to the world of work. The leadership of an AFNR-licensed teacher can support learning at all grade levels to create a continuum of learning from the elementary grades to high school. The collaborative relationship between elementary classroom teachers and AFNR-licensed teachers ensures students are acquiring the fundamental skills to be successful in their future.

While some schools may offer Agriculture, Food, and Natural Resources courses at the elementary level that meet standards found in the Wisconsin Standards for Agriculture, Food, and Natural Resources, other schools may be looking for agricultural literacy connections that can inherently be found in other contexts. The National Center for Agricultural Literacy recognizes the *National Agricultural Literacy Outcomes* (Spielmaker and Leising, 2014) as benchmarks outlining what agriculturally literate individuals should know and be able to communicate about agriculture. The *National Agricultural Literacy Outcomes* correlate to national education standards by grade level.

Delivering CTE Through Career Pathways

Through CTE, learners not only gain awareness of various careers, but also have opportunities to engage in deeper exploration and preparation through a career pathway. Each pathway—whether health science, agriculture, business, construction, or engineering, to name a few—includes elements of career and technical education that help students develop the knowledge and skills to be successful in the career of their choice.

While there is a national career cluster and pathway framework that serves to organize occupations into 16 clusters and 79 pathways, the term "career pathway" used throughout this document refers to an education and workforce development system approach that enables students to embark on a plan that outlines the education and training opportunities that will help them move toward a career goal.

Elements of CTE that create a career pathway include:

- A sequence of CTE courses that build from introductory to more advanced levels
- Work-based learning experiences
- Career and technical student organizations (CTSOs)
- Dual enrollment or college credit opportunities
- Industry-recognized credentials

Wisconsin schools use the above elements as a framework to engage with stakeholders to provide rich and authentic opportunities and experiences that help students gain knowledge and skills that go beyond the classroom experience.

While schools may independently build their own career pathways, Wisconsin's regional career pathway (RCP) approach makes the process easier for individual school districts by vetting some of the career pathway components on a regional basis and tailoring pathways to address regional employment needs. Wisconsin's regional career pathway network covers seven regions—

each with its own advisory group of local employers, educational organizations, and economic and workforce development interests.

Partnerships that bring business and educational organizations together are an effective way to ensure that students are gaining practical and up-to-date knowledge and skills necessary to get a jump-start on a career in their regional industries. Leading employers share direct input on the latest tools, practices, and processes in an industry, while K-12 schools and other educational organizations offer the professional expertise to engage and teach young learners using standards within this document.

Career Pathway Elements

A sequence of CTE courses that build from introductory to more advanced levels

Academic standards define what students should know and be able to do in an area of study. In career and technical education, standards are integrated with technical skill development based on industry standards. A coordinated sequence of two or more academic courses incorporating challenging state standards builds student knowledge, technical skills, and employability skills. The AFNR standards are designed to allow educators to build these courses from beginning and introductory level content to advanced skills. The AFNR standards were developed with reference to the national standards.

The sequencing of courses in AFNR fits several different career clusters, most specifically related to:

Agriculture, Food, and Natural Resources

Business, Management, and Administration

Manufacturing

Marketing, Sales, and Service

Science, Technology, Engineering, and Math

Transportation, Distribution, and Logistics

Work-Based Learning

Work-based learning (WBL) opportunities are employer-connected experiences that allow K-12 students to participate in career awareness, career exploration, and career development. Academic standards serve as the foundation of WBL and allow students to apply knowledge and technical skills to real-world projects and problems alongside professionals. Having students participate in work-based learning is a priority in Wisconsin and is reflected on DPI's School Report Cards and federal (Perkins V) accountability reports. Participation in work-based learning is only calculated if the program meets the following criteria:

1. Involves sustained interactions, either paid or unpaid, with industry or community professionals
   - *Sustained* = minimum of 90 hours, which can be rotated among employers or positions. The employer is engaged throughout the experience. It can take place in one semester, an entire year, the summer, or even a six-week period.
   - Interactions must be more than just observing and include direct communication and involvement with industry or community professionals.
2. Takes place in real workplace settings (as practicable) or simulated environments at an educational institution.
3. Fosters in-depth, firsthand engagement with the tasks required in a given career.
4. Aligns with a course (generally speaking should be a minimum of one semester). It is highly encouraged to provide credit for the work-based learning experience as well as credit for the school-based course.

5. Must include a training agreement between the student, employer/business, and school that defines the roles and responsibilities of the student, the employer, and the school.
6. Business and education partners work together to evaluate and supervise the experiences, which must be documented with training or learning plans and evaluation forms.

There are numerous work-based learning programs designed to support student mastery of competencies and also count towards accountability measures. These programs are all outlined in the *Wisconsin Guide to Implementing Career-Based Learning Experiences*.

Agriculture, Food, and Natural Resources Education incorporates hands-on career-based learning as an essential component to a student's educational experience within AFNR. Supervised Agricultural Experiences (SAEs) are an expectation for all students within an Agriculture, Food, and Natural Resources course as part of the SAE for All initiative.

While all students in AFNR are expected to have some level of an SAE, it is important to acknowledge that these experiences may be connected to other career-based learning experiences and may be developed into work-based learning experiences such as:

- Supervised agricultural experience (SAE)
- School-based enterprise (SBE)
- Student entrepreneurial experience (SEE)
- Internship or local co-op
- State-certified employability skills co-op
- State-certified occupational program co-op
- Youth Apprenticeship – Apprenticeships may be in agriculture mechanic technician, animal fundamentals, animal/herd, arborist, crops, dairy grazier, environmental systems: basic and advanced water resources, floral/greenhouse, landscaping, plant fundamentals, and small animal/veterinarian technician.

Career and Technical Student Organizations

Career and technical student organizations (CTSOs) develop citizenship, technical, leadership, and teamwork skills essential for students who are preparing for the workforce and further education. They enhance students' civic awareness and provide opportunities for developing social competencies and a wholesome attitude about living and working.

Wisconsin has six state and nationally recognized CTSOs that are intracurricular. In other words, they connect directly to the classroom through curriculum, activities, and community resources. All CTSOs include leadership development and competitive events where students demonstrate technical and leadership skills. CTSOs prepare young people to become productive citizens and leaders in their communities and their careers. This is done through school activities along with regional, state, and national leadership conferences and competitions. Students grow and develop through these events and receive recognition for the work they have done and the skills they have developed. CTSOs provide an exceptional extension of CTE instruction. Wisconsin's CTSOs include:

Wisconsin Association of FFA is affiliated with the National FFA Organization, the largest student-led organization in the nation with more than 945,000 members focused on growing leaders, building communities, and strengthening agriculture. FFA follows the mission statement: FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education. Wisconsin Association of FFA was chartered in 1929, and the organization is seen as a vital component of Agriculture, Food, and Natural Resources education that is integral to the classroom setting. Students build skills through FFA competitions, conferences, and leadership opportunities directly aligned to the standards for Agriculture, Food, and Natural Resources. FFA offers experience for students beginning in grade 5, provided they are enrolled in an Agriculture, Food, and Natural Resources course, and continues to offer opportunities to students up to four National FFA Conventions following their graduation from high school. For more information on FFA, please visit the Wisconsin Association of FFA website.

Industry-Recognized Credentials
Industry-recognized credentials (IRCs) are certifications, credentials, or licenses that are vetted by employers and recognize skill attainment needed for recruitment, screening, hiring, retention, advancement, or to mitigate workforce shortages. Earning industry credentials while in high school helps students prove their competence and improve their employment prospects, sometimes immediately after graduation. CTE courses are designed to improve career-based learning, and many IRCs fit perfectly into the curriculum and can be added to the student's resume following certification.

Dual Enrollment and College Credit Opportunities
Dual enrollment includes a variety of programs through which high school students are enrolled simultaneously in both high school and college to earn credit through each. A dual enrollment course can take place at the high school, at a college or university, or through an online or distance course. Local school districts partner with higher education partners to provide training for instructors to offer these courses, or avenues for students to participate in courses on campus or online. Successful completion of the coursework by a student will not only gain them a grade toward high school graduation, but also transferable credits for their postsecondary education.

Discipline Standards Structure

The Wisconsin Standards for Agriculture, Food, and Natural Resources follow a specific structure:

Standards Formatting

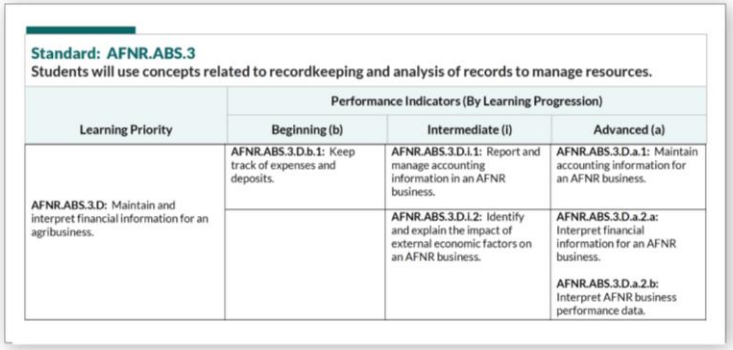
- **Discipline:** CTE program area
- **Strand:** Instructional topic within the discipline
- **Standard:** Broad statement that tells what students are expected to know or be able to do
- **Learning Priority:** Breaks down the broad statement into manageable learning pieces
- **Performance Indicator by Learning Progression:** Measurable degree to which a standard has been developed or met

Standard Coding
Standard areas for Agriculture, Food, and Natural Resources in this code structure include:

- Agricultural, Literacy, Leadership, and Research (ALLR)
- Agribusiness (ABS)
- Animal Science (AS)
- Biotechnology (BT)
- Environmental and Natural Resources (ENR)
- Food Chemistry and Processing (FCP)
- Plant Science (PS)
- Power, Structural, and Mechanical Technology (PSMT)

Key to Standards Coding

Sample of Standards Table



Standard: AFNR.ABS.3
Students will use concepts related to recordkeeping and analysis of records to manage resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.ABS.3.D: Maintain and interpret financial information for an agribusiness.	AFNR.ABS.3.D.b.1: Keep track of expenses and deposits.	AFNR.ABS.3.D.i.1: Report and manage accounting information in an AFNR business.	AFNR.ABS.3.D.a.1: Maintain accounting information for an AFNR business.
		AFNR.ABS.3.D.i.2: Identify and explain the impact of external economic factors on an AFNR business.	AFNR.ABS.3.D.a.2.a: Interpret financial information for an AFNR business. AFNR.ABS.3.D.a.2.b: Interpret AFNR business performance data.

Performance Indicator by Learning Progression
The 2024 Wisconsin Standards for Career and Technical Education (CTE) mark a shift in how progress is recognized in a CTE subject area. The new standards describe three levels of proficiency or mastery of industry expectations: beginning, intermediate, and advanced. This contrasts with the 2013 CTE standards, which focused on performance indicators by three grade bands: PK-5, 6-8, and 9-12.

Given the wide range of delivery models used, CTE does not lend itself to grade bands. In other words, CTE programming may be nonexistent or robust at the elementary or middle school levels. A beginning course, for example, may be offered in any grade. The 2024 CTE standards, more appropriately, shift from looking at knowledge and skills acquired by the end of certain grade

levels to the increasing mastery a student acquires as they pursue their desired career pathway, regardless of the grade the student begins on that path. Here then are the three levels in more detail:

- Beginning: Developing awareness
- Intermediate: Building foundational knowledge and skills
- Advanced: Implementing specific knowledge and skills

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.ABS.3.D: Maintain and interpret financial information for an agribusiness.	**AFNR.ABS.3.D.b.1:** Keep track of expenses and deposits.	**AFNR.ABS.3.D.i.1:** Report and manage accounting information in an AFNR business.	**AFNR.ABS.3.D.a.1:** Maintain accounting information for an AFNR business.
		AFNR.ABS.3.D.i.2: Identify and explain the impact of external economic factors on an AFNR business.	**AFNR.ABS.3.D.a.2.a:** Interpret financial information for an AFNR business. **AFNR.ABS.3.D.a.2.b:** Interpret AFNR business performance data.

The standards were designed to be flexible based on the unique needs of each Agriculture, Food, and Natural Resources program. Courses are meant to be aligned to the standards through the scaffolding of student learning and level of mastery desired. Each learning priority has one or more performance indicators by learning progression, reflecting a sequential flow of learning and a continuum from beginning to advanced. Course design may consist of the full continuum or may begin and end with any learning progression level. Furthermore, the performance indicator descriptors may cross over or overlap each other

from one level to the next. For example, the beginning level may include some foundational knowledge and skill-building connected to the intermediate level versus solely focusing on developing awareness.

AFNR performance indicators were written to allow the educator to build content from beginning to advanced levels, based on the design of the course. In several standards, there may be blank spaces at any point within the learning progression based on the skill development of the particular standard. Multiple performance indicators may also be found at the same learning progression level. This makes it possible to encompass the full scope of skills and knowledge relevant within the specific standard or learning priority. Educators may also experience situations where standards within different strands may be pulled into courses not directly tied to the strand. This is appropriate as many concepts cross-cut several strands and pull together the skills and knowledge in a variety of contexts. This design allows for flexibility to fit the needs of the educator, course, and district in order for students to demonstrate their knowledge of the content.

In conclusion, these standards provide a foundation for a variety of applications in each of Wisconsin's districts.

Section III

Discipline: Agriculture, Food, and Natural Resources

Strand: Agricultural Literacy, Leadership, and Research (ALLR)

Standard: AFNR.ALLR.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities related to agricultural literacy.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.ALLR.1.A: Trace historical development of agriculture's role in establishing ancient and modern societies.	**AFNR.ALLR.1.A.b.1:** Identify agriculture's foundational role in establishing ancient and modern societies.	**AFNR.ALLR.1.A.i.1:** Explain how and why innovation in agriculture influenced modern systems, including economic, government and social systems.	**AFNR.ALLR.1.A.a.1:** Analyze current and future roles and needs of agriculture in the context of growth and development of society.
AFNR.ALLR.1.B: Understand how science, technology, engineering, and math (STEM) is integrated into agriculture.	**AFNR.ALLR.1.B.b.1:** Identify STEM concepts in the context of agriculture.	**AFNR.ALLR.1.B.i.1:** Explain how STEM concepts address and contribute to labor and solve production and environmental challenges.	**AFNR.ALLR.1.B.a.1:** Practice and apply STEM skills in the context of agricultural production, industry, and literacy.
AFNR.ALLR.1.C: Determine relationships among agriculture, environment, plants, and animals for food, fiber, energy, health, society, and economics.	**AFNR.ALLR.1.C.b.1:** Identify factors and resources connected to inputs and outputs of agriculture.	**AFNR.ALLR.1.C.i.1:** Explain and consider environmental, social, and economic impacts of decisions relating to agricultural production and industry.	**AFNR.ALLR.1.C.a.1:** Make, defend, and evaluate agricultural decisions using information regarding potential impacts to economy, environment, and society.
AFNR.ALLR.1.D: Identify and understand connections between academic subjects and agricultural careers including, but not limited to STEM.	**AFNR.ALLR.1.D.b.1:** Identify career pathways intersecting with agriculture.	**AFNR.ALLR.1.D.i.1.a:** Understand need to specialize careers to support and serve agriculture.	**AFNR.ALLR.1.D.a.1.a:** Develop a personal agricultural career path/plan.

Standard: AFNR.ALLR.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities related to agricultural literacy.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ALLR.1.D: Identify and understand connections between academic subjects and agricultural careers including, but not limited to STEM.		**AFNR.ALLR.1.D.i.1.b:** Examine career advancement requirements, including degrees, certifications, and training.	**AFNR.ALLR.1.D.a.1.b:** Create goals for personal improvement and continuous growth in a career area.
AFNR.ALLR.1.E: Understand and communicate the importance and value of agriculture in daily life.	**AFNR.ALLR.1.E.b.1:** Examine components of AFNR systems, and assess impact on local, state, national, and global society and economy.	**AFNR.ALLR.1.E.i.1:** Analyze how issues, trends, technologies, and public policies impact systems in the AFNR Career Cluster and Pathways.	**AFNR.ALLR.1.E.a.1:** Develop and execute a communication plan to increase awareness and understanding of agriculture's impact in society.
AFNR.ALLR.1.F: Investigate global implications of agriculture.	**AFNR.ALLR.1.F.b.1:** Identify types and diversity of AFNR systems on a global scale based on geography, climate, and social constructs.	**AFNR.ALLR.1.F.i.1:** Research and use geographic and economic data to solve problems in AFNR systems.	**AFNR.ALLR.1.F.a.1:** Research, examine, and discuss issues and trends impacting AFNR systems on local, state, national, and global levels.
AFNR.ALLR.1.G: Analyze current and future trends in agricultural literacy.	**AFNR.ALLR.1.G.b.1:** Define "agricultural literacy."	**AFNR.ALLR.1.G.i.1:** Observe the changes and connections between agriculture and society.	**AFNR.ALLR.1.G.a.1:** Identify opportunities to research, analyze, and adapt communication strategies for agricultural literacy.

Standard: AFNR.ALLR.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities related to agricultural literacy.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.ALLR.1.H: Communicate and work effectively in agricultural literacy, leadership, and research settings with individuals and groups representing diverse backgrounds and abilities	**AFNR.ALLR.1.H.b.1:** Identify barriers to effective communication in agricultural literacy, leadership and research settings based on diverse backgrounds and abilities.	**AFNR.ALLR.1.H.i.1:** Develop plans to communicate and work effectively in agricultural literacy, leadership, and research settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.ALLR.1.H.a.1:** Implement plans to communicate and work effectively in agricultural literacy, leadership, and research settings with individuals and groups representing diverse backgrounds and abilities.

Standard: AFNR.ALLR.2

Students will implement communication and group leadership concepts in AFNR activities.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.ALLR.2.A: Implement leadership and group-dynamic skills.	**AFNR.ALLR.2.A.b.1:** Identify leadership categories and styles.	**AFNR.ALLR.2.A.i.1:** Understand the relationship of personality types with human behavior regarding leadership development.	**AFNR.ALLR.2.A.a.1:** Develop a leadership plan to lead a team or group.
AFNR.ALLR.2.B: Develop skills for leading individuals and groups.	**AFNR.ALLR.2.B.b.1:** Evaluate the components of a meeting.	**AFNR.ALLR.2.B.i.1:** Identify the value of providing structure to a meeting and create a meeting agenda.	**AFNR.ALLR.2.B.a.1:** Use parliamentary procedure to conduct a meeting.

Standard: AFNR.ALLR.2

Students will implement communication and group leadership concepts in AFNR activities.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ALLR.2.C: Apply managerial leadership skills.	**AFNR.ALLR.2.C.b.1:** Understand problem-solving and decision-making skills.	**AFNR.ALLR.2.C.i.1:** Identify goal-setting and time-management skills.	**AFNR.ALLR.2.C.a.1:** Develop the ability to motivate others.
AFNR.ALLR.2.D: Integrate personal development skills.	**AFNR.ALLR.2.D.b.1:** Identify components of self-concept.	**AFNR.ALLR.2.D.i.1:** Investigate the importance of attitude.	**AFNR.ALLR.2.D.a.1:** Develop ethics in the work place.
AFNR.ALLR.2.E: Develop transition to work skills.	**AFNR.ALLR.2.E.b.1:** Select a career path.	**AFNR.ALLR.2.E.i.1:** Create resumes, applications and interview skills.	**AFNR.ALLR.2.E.a.1:** Develop employability skills through career-based learning experiences.
AFNR.ALLR.2.F: Speak using strategies ensuring clarity, logic, purpose, and professionalism.	**AFNR.ALLR.2.F.b.1:** Identify and categorize strategies for ensuring clarity, logic, purpose, and professionalism in verbal and nonverbal communication.	**AFNR.ALLR.2.F.i.1:** Analyze use of verbal and nonverbal communication strategies.	**AFNR.ALLR.2.F.a.1:** Evaluate others' verbal and nonverbal communication, and propose recommendations for improvement.
	AFNR.ALLR.2.F.b.2: Examine and assess personal ability to speak with clarity, logic, purpose, and professionalism.	**AFNR.ALLR.2.F.i.2:** Apply strategies of speaking with clarity, logic, purpose, and professionalism.	**AFNR.ALLR.2.F.a.2:** Evaluate personal strengths and identify ways to improve speaking with clarity, logic, purpose, and professionalism.
	AFNR.ALLR.2.F.b.3: Distinguish between concepts of debate and discussion.	**AFNR.ALLR.2.F.i.3:** Develop basic principles of speaking by reciting.	**AFNR.ALLR.2.F.a.3:** Create and present prepared and extemporaneous speeches.

Standard: AFNR.ALLR.2

Students will implement communication and group leadership concepts in AFNR activities.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ALLR.2.G: Model active listening strategies when interacting with others.	**AFNR.ALLR.2.G.b.1:** Research and summarize components of active listening.	**AFNR.ALLR.2.G.i.1:** Apply active listening strategies.	**AFNR.ALLR.2.G.a.1:** Evaluate personal effectiveness, and devise a plan to improve active listening skills.
	AFNR.ALLR.2.G.b.2: Observe and identify use of active listening strategies in formal and informal settings.	**AFNR.ALLR.2.G.i.2:** Apply and evaluate personal level of active listening strategies in formal and informal settings.	**AFNR.ALLR.2.G.a.2:** Model active listening strategies in formal and informal settings.
AFNR.ALLR.2.H: Produce clear, reasoned, and coherent written and visual communication.	**AFNR.ALLR.2.H.b.1:** Research and summarize the purpose of different forms of written and visual communication.	**AFNR.ALLR.2.H.i.1:** Compare and contrast the structure of different forms of written and visual communication.	**AFNR.ALLR.2.H.a.1:** Evaluate the effectiveness of different forms of written and visual communication for achieving an intended purpose.
	AFNR.ALLR.2.H.b.2: Identify and examine methods for producing clear, reasoned, and coherent written and visual communication appropriate to task, purpose, and audience.	**AFNR.ALLR.2.H.i.2:** Apply techniques for ensuring clarity, logic, and coherence to edit written and visual communications.	**AFNR.ALLR.2.H.a.2:** Compose clear and coherent written documents and visuals adapted to audience needs in formal and informal settings.
AFNR.ALLR.2.I: Understand and communicate the importance and value of agriculture in daily life in relation to animals and plants, lifestyle, economy, technology, and FFA.	**AFNR.ALLR.2.I.b.1:** Examine the components of the AFNR systems, and assess their impact on the local, state, national, and global society and economy.	**AFNR.ALLR.2.I.i.1:** Analyze how issues, trends, technologies, and public policies impact systems in AFNR Career Clusters and Pathways.	**AFNR.ALLR.2.I.a.1:** Develop and execute a communication plan to increase awareness and understanding of agriculture‘s impact in society.

Standard: AFNR.ALLR.3

Students will implement valid and reliable research strategies in AFNR concepts.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ALLR.3.A: Select and implement reliable research processes and methods to generate data for decision-making in AFNR.	**AFNR.ALLR.3.A.b.1:** Identify and summarize reliable research processes and methods.	**AFNR.ALLR.3.A.i.1:** Analyze how different research methods are used to generate data in a variety of situations.	**AFNR.ALLR.3.A.a.1:** Evaluate the use of research methods and processes, and propose recommendations for improvement.
	AFNR.ALLR.3.A.b.2: Identify data requirements and research strategies to generate necessary data.	**AFNR.ALLR.3.A.i.2:** Assess positives and negatives of using different research strategies and methods to generate data, and use information to select appropriate methods.	**AFNR.ALLR.3.A.a.2:** Design plans for use and implementation of reliable research methods to generate data for decision-making.
AFNR.ALLR.3.B: Evaluate the validity of sources and data used in decision-making.	**AFNR.ALLR.3.B.b.1:** Identify and summarize types of data sources available to research new technologies and practices.	**AFNR.ALLR.3.B.i.1:** Assess data sources for reliability and validity.	**AFNR.ALLR.3.B.a.1:** Propose valid and reliable data sources to use in decision-making.
	AFNR.ALLR.3.B.b.2: Categorize potential technologies, practices, and ideas for adoption.	**AFNR.ALLR.3.B.i.2:** Utilize data to assist in decision-making.	**AFNR.ALLR.3.B.a.2:** Create and defend proposals using valid and reliable data sources.

Standard: AFNR.ALLR.4

Students will engage in intracurricular groups, professional organizations, or community involvement.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ALLR.4.A: Act as a responsible and contributing member of intracurricular groups, professional organizations, and community groups.	**AFNR.ALLR.4.A.b.1:** Define and categorize opportunities for professional service at school, work, and community.	**AFNR.ALLR.4.A.i.1:** Assess available professional service opportunities at school, work, and community.	**AFNR.ALLR.4.A.a.1:** Devise, implement, and evaluate strategies for involvement in professional opportunities at school, work, and community.
	AFNR.ALLR.4.A.b.2: Identify civic service and volunteer opportunities at school, work, and community.	**AFNR.ALLR.4.A.i.2:** Assess available civic service or volunteer opportunities at school, work, and community, based on personal interests.	**AFNR.ALLR.4.A.a.2:** Devise, implement, and evaluate strategies for personal involvement in civic service or volunteer opportunities at school, work, and community.
AFNR.ALLR.4.B: Work productively in teams, groups, clubs, and organizations.	**AFNR.ALLR.4.B.b.1:** Differentiate strengths and talents of team members needed to complete projects and tasks.	**AFNR.ALLR.4.B.i.1:** Formulate action plans to complete team-oriented projects in school, at work, or in the community, including plans for personal contributions.	**AFNR.ALLR.4.B.a.1:** Evaluate effectiveness of team-oriented projects in groups, clubs, and organizations.
	AFNR.ALLR.4.B.b.2: Identify and summarize techniques to build consensus in teams, groups, clubs, and organizations.	**AFNR.ALLR.4.B.i.2:** Apply consensus-building techniques to accomplish results in team-oriented situations.	**AFNR.ALLR.4.B.a.2:** Devise and implement methods to obtain feedback from team members on experiences after completing team-oriented projects.

Standard: AFNR.ALLR.4

Students will engage in intracurricular groups, professional organizations, or community involvement.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ALLR.4.C: Create and implement strategies to engage team members to work toward goals in teams, groups, clubs, and organizations.	**AFNR.ALLR.4.C.b.1:** Identify and summarize effective strategies used to engage team members to accomplish goals.	**AFNR.ALLR.4.C.i.1:** Assess team dynamics, and match strategies to increase team-member engagement.	**AFNR.ALLR.4.C.a.1:** Create and implement novel strategies to engage team members to accomplish goals.
	AFNR.ALLR.4.C.b.2: Examine and summarize workplace and community situations where it is important to engage team members to achieve goals.	**AFNR.ALLR.4.C.i.2:** Select strategies to engage team members and apply strategies in a variety of situations.	**AFNR.ALLR.4.C.a.2:** Evaluate effectiveness of strategies to engage team members in a variety of situations.
AFNR.ALLR.4.D: Connect and apply academic learning, knowledge, and technical skills to solve problems as an active member of the FFA.	**AFNR.ALLR.4.D.b.1:** Describe the National FFA Organization and how it relates to the three-component model of agricultural education.	**AFNR.ALLR.4.D.i.1:** Identify opportunities to apply cross-curricular academic learning and technical skills to involvement in FFA.	**AFNR.ALLR.4.D.a.1:** Practice applying academic knowledge and technical skills in FFA, and reflect on the results achieved.

Standard: AFNR.ALLR.5

Students will gain agricultural skills through an agricultural literacy, leadership, and research Supervised Agricultural Experience Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ALLR.5.A: Evaluate and implement steps and requirements to pursue a career opportunity in an AFNR career pathway.	**AFNR.ALLR.5.A.b.1:** Identify and summarize steps to pursue a career in an AFNR pathway.	**AFNR.ALLR.5.A.i.1:** Create a personal plan outlining goals and steps to obtain a career in an AFNR pathway.	**AFNR.ALLR.5.A.a.1:** Evaluate progress toward AFNR career goals, and identify opportunities for improvement and necessary adjustments to an individual career plan.
	AFNR.ALLR.5.A.b.2: Examine educational, training, and experiential requirements to pursue a career in an AFNR pathway.	**AFNR.ALLR.5.A.i.2:** Analyze personal skill set and add to career plan options for attaining required education, training, and experiences to obtain a career in an AFNR pathway.	**AFNR.ALLR.5.A.a.2:** Evaluate, update, and improve a set of personal tools to reflect current skills, experiences, education, and goals, and complete processes needed to pursue and obtain a career in an AFNR pathway.
AFNR.ALLR.5.B: Examine and choose career opportunities matched to personal skills, talents, and career goals in an AFNR pathway of interest.	**AFNR.ALLR.5.B.b.1:** Research and describe careers in each of the AFNR pathways, and choose potential careers connecting to personal interests and skills.	**AFNR.ALLR.5.B.i.1:** Assemble and analyze examples of careers and related statistics on local, state, national, and global levels.	**AFNR.ALLR.5.B.a.1:** Conduct interviews with career professionals within the AFNR pathways, and summarize the results.
AFNR.ALLR.5.C: Connect and apply academic learning, knowledge, and technical skills to solve problems through a Supervised Agriculture Experience (SAE).		**AFNR.ALLR.5.C.i.1:** Identify opportunities to apply cross-curricular academic learning and technical skills to an SAE.	**AFNR.ALLR.5.C.a.1:** Practice applying academic knowledge and technical skills in an SAE, and reflect on the results achieved.

Strand: Agribusiness (ABS)

Standard: AFNR.ABS.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities in agribusiness.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.ABS.1.A: Examine the components common to agribusinesses.	**AFNR.ABS.1.A.b.1:** Gain awareness of agricultural law and policy as it relates to agribusinesses.	**AFNR.ABS.1.A.i.1:** Interpret agricultural law and policy as it relates to agribusiness.	**AFNR.ABS.1.A.a.1:** Implement agricultural law and policy as it relates to agribusiness.
AFNR.ABS.1.B: Use agribusiness applications.	**AFNR.ABS.1.B.b.1:** Identify examples of agribusiness applications.	**AFNR.ABS.1.B.i.1:** Evaluate agribusiness applications.	**AFNR.ABS.1.B.a.1:** Create agribusiness applications.
AFNR.ABS.1.C: Trace the historical development of agribusiness.	**AFNR.ABS.1.C.b.1:** Identify events that impacted agribusiness over time.	**AFNR.ABS.1.C.i.1:** Trace the historical development of agribusiness.	**AFNR.ABS.1.C.a.1:** Identify historical developments in agribusiness that have been repeated over time, and assess their causes and outcomes.
AFNR.ABS.1.D: Investigate global implications of agribusinesses.	**AFNR.ABS.1.D.b.1:** Identify global implications of agribusiness.	**AFNR.ABS.1.D.i.1:** Investigate global implications of agribusiness.	**AFNR.ABS.1.D.a.1:** Predict how global events will affect agribusiness.
AFNR.ABS.1.E: Analyze current and future trends in agriculture and agribusiness.	**AFNR.ABS.1.E.b.1:** Identify current and future trends in agriculture and agribusiness.	**AFNR.ABS.1.E.i.1:** Investigate current and future trends in agriculture and agribusiness and their impact.	**AFNR.ABS.1.E.a.1:** Analyze current and future trends in agriculture and agribusiness, and predict their impact.

Standard: AFNR.ABS.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities in agribusiness.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ABS.1.F: Engage in career opportunities in agribusiness.	**AFNR.ABS.1.F.b.1:** Identify career opportunities in agribusiness.	**AFNR.ABS.1.F.i.1:** Investigate career opportunities in agribusiness and the pathways to achieve them.	**AFNR.ABS.1.F.a.1:** Engage in career opportunities in agribusiness.
AFNR.ABS.1.G: Communicate and work effectively in agribusiness settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.ABS.1.G.b.1:** Identify barriers to effective communication in agribusiness settings based on diverse backgrounds and abilities.	**AFNR.ABS.1.G.i.1:** Develop plans to communicate and work effectively in agribusiness settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.ABS.1.G.a.1:** Implement plans to communicate and work effectively in agribusiness settings with individuals and groups representing diverse backgrounds and abilities.

Standard: AFNR.ABS.2

Students will examine the components of the economic principles of business management of an AFNR enterprise.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.ABS.2.A: Design and implement a personal financial management plan.	**AFNR.ABS.2.A.b.1:** Research and examine components of personal financial literacy.	**AFNR.ABS.2.A.i.1:** Analyze management tools available for managing personal finances.	**AFNR.ABS.2.A.a.1:** Appraise and select management tools to include a personal financial management plan.
	AFNR.ABS.2.A.b.2: Examine and categorize personal financial practices.	**AFNR.ABS.2.A.i.2:** Analyze the effectiveness of a personal financial management plan, and explain how this practice contributes to future financial independence.	**AFNR.ABS.2.A.a.2:** Design, implement, and evaluate a personal financial management plan.
AFNR.ABS.2.B: Apply the principles of capitalism to an agribusiness.	**AFNR.ABS.2.B.b.1:** Recognize the use of money as a medium for exchange in a capitalist system.	**AFNR.ABS.2.B.i.1:** Recognize principles of capitalism as it relates to AFNR businesses.	**AFNR.ABS.2.B.a.1:** Differentiate types of ownership and outline the structure of AFNR businesses in a capitalist economic system.
AFNR.ABS.2.C: Apply the principles of entrepreneurship to an agribusiness.	**AFNR.ABS.2.C.b.1:** Describe the meaning, importance, and economic impact of entrepreneurship.	**AFNR.ABS.2.C.i.1:** Classify the characteristics of successful entrepreneurs in an AFNR business.	**AFNR.ABS.2.C.a.1:** Demonstrate entrepreneurship, including idea generation, opportunity analysis, and risk management.

Standard: AFNR.ABS.3

Students will use concepts related to recordkeeping and analysis of records to manage resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ABS.3.A: Prepare and maintain files needed to accomplish effective recordkeeping.	**AFNR.ABS.3.A.b.1:** Identify information needed for sound record-retention processes.	**AFNR.ABS.3.A.i.1:** Maintain production and agribusiness records.	**AFNR.ABS.3.A.a.1.a:** Analyze records to improve efficiency and profitability of an AFNR business. **AFNR.ABS.3.A.a.1.b:** Apply management information systems in an AFNR business financial analysis.
AFNR.ABS.3.B: Implement appropriate inventory-management practices.	**AFNR.ABS.3.B.b.1:** Consider items a business might own or borrow to operate.	**AFNR.ABS.3.B.i.1:** Monitor inventory to maintain optimal levels, and calculate costs of carrying input and output inventory.	**AFNR.ABS.3.B.a.1:** Use technology in inventory management and reporting.
AFNR.ABS.3.C: Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management.	**AFNR.ABS.3.C.b.1.a:** Create a personal budget for earning and spending. **AFNR.ABS.3.C.b.1.b:** Describe the income and expenses of a business.	**AFNR.ABS.3.C.i.1:** Budget resources for an AFNR business.	**AFNR.ABS.3.C.a.1.a:** Manage assets and credit for an AFNR business. **AFNR.ABS.3.C.a.1.b:** Manage resources to minimize liabilities and maximize profits.

Standard: AFNR.ABS.3

Students will use concepts related to recordkeeping and analysis of records to manage resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ABS.3.C: Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management.	**AFNR.ABS.3.C.b.2:** Define financial terminology including but not limited to income, expense, profit, and loss.	**AFNR.ABS.3.C.i.2:** Identify financial concepts associated with production and profit.	**AFNR.ABS.3.C.a.2.a:** Use accounting information to estimate cost of goods sold and profit margins. **AFNR.ABS.3.C.a.2.b:** Evaluate characteristics of sources of capital.
	AFNR.ABS.3.C.b.3: Define return on investment and identify how to measure ROI.	**AFNR.ABS.3.C.i.3:** Explain the importance of return on investment (ROI) for an agribusiness enterprise.	**AFNR.ABS.3.C.a.3.a:** Analyze reporting requirements for income, property, and employment taxes associated with an AFNR business. **AFNR.ABS.3.C.a.3.b:** Evaluate the use of accountants in an AFNR business.
AFNR.ABS.3.D: Maintain and interpret financial information for an agribusiness.	**AFNR.ABS.3.D.b.1:** Keep track of expenses and deposits.	**AFNR.ABS.3.D.i.1:** Report and manage accounting information in an AFNR business.	**AFNR.ABS.3.D.a.1:** Maintain accounting information for an AFNR business.
		AFNR.ABS.3.D.i.2: Identify and explain the impact of external economic factors on an AFNR business.	**AFNR.ABS.3.D.a.2.a:** Interpret financial information for an AFNR business. **AFNR.ABS.3.D.a.2.b:** Interpret AFNR business performance data.

Standard: AFNR.ABS.4

Students will develop an AFNR business plan.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ABS.4.A: Develop a strategic management plan.	**AFNR.ABS.4.A.b.1:** Identify components of a strategic management plan for an AFNR business.	**AFNR.ABS.4.A.i.1:** Evaluate a strategic management plan for an AFNR business.	**AFNR.ABS.4.A.a.1:** Create a strategic management plan for an AFNR business.
AFNR.ABS.4.B: Interpret, evaluate and create business goals, vision statements, and missions.	**AFNR.ABS.4.B.b.1:** Identify business goals, vision statement, and mission for an AFNR business.	**AFNR.ABS.4.B.i.1:** Evaluate business goals, vision statement, and mission for an AFNR business.	**AFNR.ABS.4.B.a.1:** Create business goals, vision statement, and mission for an AFNR business.
AFNR.ABS.4.C: Develop a production and operational plan.	**AFNR.ABS.4.C.b.1:** Consider the use of a plan to conduct an activity.	**AFNR.ABS.4.C.i.1:** Identify the components of production and operational plans.	**AFNR.ABS.4.C.a.1.a:** Evaluate the components of a production and operational plan, and make revisions to an existing plan. **AFNR.ABS.4.C.a.1.b:** Develop and implement an AFNR product supply-and-distribution plan.
		AFNR.ABS.4.C.i.2: Identify common resources needed to operate an AFNR production facility.	**AFNR.ABS.4.C.a.2.a:** Examine legal and industry requirements for an AFNR production facility. **AFNR.ABS.4.C.a.2.b:** Develop an AFNR production facility plan, including buildings, equipment, personnel, utilities, and logistics components.

Standard: AFNR.ABS.4

Students will develop an AFNR business plan.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ABS.4.D: Investigate succession and estate planning steps and options.	**AFNR.ABS.4.D.b.1:** Identify the need for succession and estate planning.	**AFNR.ABS.4.D.i.1:** Evaluate a succession or estate plan.	**AFNR.ABS.4.D.a.1:** Create a succession or estate plan.
AFNR.ABS.4.E: Utilize fixed and variable costs to create a cost analysis.	**AFNR.ABS.4.E.b.1:** Identify fixed and variable cost for an AFNR business.	**AFNR.ABS.4.E.i.1:** Evaluate a cost analysis for an AFNR business.	**AFNR.ABS.4.E.a.1:** Create a fixed and variable cost analysis for an AFNR business.
AFNR.ABS.4.F: Identify and evaluate types of business structure.	**AFNR.ABS.4.F.b.1:** Identify types of business structure used in the AFNR industry.	**AFNR.ABS.4.F.i.1:** Analyze business structure types used in AFNR industry.	**AFNR.ABS.4.F.a.1:** Compare and contrast types of business structures used in the AFNR industry.
AFNR.ABS.4.G: Determine real estate acquisition best practices.	**AFNR.ABS.4.G.b.1:** Identify real estate acquisition best practices.	**AFNR.ABS.4.G.i.1:** Analyze real estate acquisition concepts.	**AFNR.ABS.4.G.a.1:** Acquire mock real estate for an AFNR business.
AFNR.ABS.4.H: Use concepts and functions related to AFNR risk management.	**AFNR.ABS.4.H.b.1:** Identify sources of risk for an AFNR business.	**AFNR.ABS.4.H.i.1.a:** Determine the level of risk regarding financial, market, legal, production, and human resources. **AFNR.ABS.4.H.i.1.b:** Identify types of insurance.	**AFNR.ABS.4.H.a.1.a:** Develop a risk management process and plan. **AFNR.ABS.4.H.a.1.b:** Determine the need for each type of insurance.

Standard: AFNR.ABS.5

Students will use sales and marketing principles to accomplish AFNR business objectives.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ABS.5.A: Conduct appropriate market and marketing research.	**AFNR.ABS.5.A.b.1:** Consider ways to market products of an AFNR business.	**AFNR.ABS.5.A.i.1:** Investigate methods of marketing AFNR commodities, products, and services in domestic and international markets.	**AFNR.ABS.5.A.a.1:** Apply benefit-cost analysis to marketing in an AFNR business.
	AFNR.ABS.5.A.b.2: Identify agricultural products and services and their need for marketing.	**AFNR.ABS.5.A.i.2:** Describe the principles of agricultural marketing.	**AFNR.ABS.5.A.a.2.a:** Implement and evaluate marketing strategies for agricultural commodities, products, and services. **AFNR.ABS.5.A.a.2.b:** Assess the presence of marketing infrastructure for agricultural commodities.
AFNR.ABS.5.B: Use marketing skills to develop a marketing plan.	**AFNR.ABS.5.B.b.1:** Identify places where consumers purchase agricultural products and factors they consider when selecting products.	**AFNR.ABS.5.B.i.1:** Identify the purpose, components, and developmental processes of marketing plans.	**AFNR.ABS.5.B.a.1:** Perform a marketing analysis.
		AFNR.ABS.5.B.i.2: Evaluate alternative marketing strategies.	**AFNR.ABS.5.B.a.2.a:** Establish marketing plan goals and objectives. **AFNR.ABS.5.B.a.2.b:** Determine marketing strategies that are effective in an AFNR business.

Standard: AFNR.ABS.5

Students will use sales and marketing principles to accomplish AFNR business objectives.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ABS.5.C: Develop strategies for marketing plan implementation.	**AFNR.ABS.5.C.b.1:** Consider how to persuade others to buy AFNR business goods.	**AFNR.ABS.5.C.i.1:** Identify and use strategies frequently employed in marketing programs.	**AFNR.ABS.5.C.a.1.a:** Implement alternative marketing strategies. **AFNR.ABS.5.C.a.1.b:** Revise marketing strategies based on monitoring and measurement information for the target customer base.
AFNR.ABS.5.D: Develop specific tactics to market AFNR products and services.	**AFNR.ABS.5.D.b.1:** Identify people involved in bringing agricultural products to consumers.	**AFNR.ABS.5.D.i.1:** Identify and maintain sales records.	**AFNR.ABS.5.D.a.1.a:** Use strategies to follow up sales to provide post-sales service. **AFNR.ABS.5.D.a.1.b:** Intercept, interpret, and process customer complaints, customer needs, and problems with AFNR products and services.

Standard: AFNR.ABS.6

Students will gain agricultural skills through an agribusiness Supervised Agricultural Experience (SAE) Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ABS.6.A: Evaluate and implement steps and requirements to pursue a career opportunity in an AFNR career pathway.	**AFNR.ABS.6.A.b.1:** Identify and summarize the steps to pursue a career in an AFNR pathway.	**AFNR.ABS.6.A.i.1:** Create a personal plan outlining goals and steps to obtain a career in an AFNR pathway.	**AFNR.ABS.6.A.a.1:** Evaluate progress toward AFNR career goals, and identify opportunities for improvement and necessary adjustments to individual career plan.
	AFNR.ABS.6.A.b.2: Examine educational, training, and experiential requirements to pursue a career in an AFNR pathway.	**AFNR.ABS.6.A.i.2:** Analyze personal skill set, and add to career plan options for attaining required education, training, and experiences to obtain a career through an AFNR pathway.	**AFNR.ABS.6.A.a.2:** Evaluate, update, and improve a set of personal tools to reflect current skills, experiences, education, and goals, and complete processes needed to pursue and obtain a career through an AFNR pathway.
AFNR.ABS.6.B: Examine and choose career opportunities matched to personal skills, talents, and career goals in an AFNR pathway of interest.	**AFNR.ABS.6.B.b.1:** Research and describe careers in each of the AFNR pathways, and choose potential careers connecting to personal interests and skills.	**AFNR.ABS.6.B.i.1:** Assemble and analyze examples of careers and related statistics on local, state, national, and global levels.	**AFNR.ABS.6.B.a.1:** Conduct interviews with career professionals within the AFNR pathways, and summarize the results.
AFNR.ABS.6.C: Connect and apply academic learning, knowledge, and technical skills to solve problems through a Supervised Agriculture Experience (SAE).		**AFNR.ABS.6.C.i.1:** Identify opportunities to apply cross-curricular academic learning and technical skills to an SAE.	**AFNR.ABS.6.C.a.1:** Practice applying academic knowledge and technical skills in an SAE, and reflect on the results achieved.

Strand: Animal Science (AS)

Standard: AFNR.AS.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of animal systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.1.A: Evaluate the development and implications of animal origin, domestication, and distribution on production practices and the environment.	**AFNR.AS.1.A.b.1:** Identify and summarize the origin, significance, distribution, and domestication of animal species.	**AFNR.AS.1.A.i.1:** Distinguish characteristics of animals developed in response to the animals' environment that led to their domestication.	**AFNR.AS.1.A.a.1:** Evaluate implications of animal adaptations on production practices and the environment.
	AFNR.AS.1.A.b.2: Research and summarize major components of animal systems: livestock, companion animal, aquaculture, etc.	**AFNR.AS.1.A.i.2:** Describe historical and scientific developments of different animal industries, and summarize products, services, and associated careers.	**AFNR.AS.1.A.a.2:** Predict possible trends and implications of future developments within different animal industries on production practices, society, and the environment.
AFNR.AS.1.B: Analyze and apply laws and sustainable practices to animal agriculture from a global perspective.	**AFNR.AS.1.B.b.1:** Investigate local, national, and global laws pertaining to different animal production systems.	**AFNR.AS.1.B.i.1:** Analyze the structure of laws governing animal industries, international trade, and animal production policies.	**AFNR.AS.1.B.a.1:** Evaluate the impact of laws pertaining to animal agriculture, and assess compliance of production practices with established regulations.
	AFNR.AS.1.B.b.2: Define "sustainability" in animal systems.	**AFNR.AS.1.B.i.2:** Analyze the local and global impact of sustainable animal agriculture practices on human and environmental systems.	**AFNR.AS.1.B.a.2:** Select, evaluate, and defend the use of sustainable practices in animal agriculture.

Standard: AFNR.AS.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of animal systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.1.C: Evaluate the importance of the animal science industry to understand the impact on the global economy.	**AFNR.AS.1.C.b.1:** Recognize the value of the food and agribusiness industry.	**AFNR.AS.1.C.i.1:** Assess the impact of the animal science industry upon the United States' gross national product and the total global economy.	**AFNR.AS.1.C.a.1:** Research new and emerging technologies in animal agriculture and their impact on the economy.
AFNR.AS.1.D: Evaluate various occupations related to animal industries.	**AFNR.AS.1.D.b.1:** Identify careers related to the animal industry.	**AFNR.AS.1.D.i.1:** Examine careers related to the animal industry.	**AFNR.AS.1.D.a.1:** Create a career plan for a career in the animal industry.
AFNR.AS.1.E: Communicate effectively utilizing disciplinary literacy.	**AFNR.AS.1.E.b.1:** Identify terms and methods related to animal production.	**AFNR.AS.1.E.i.1:** Explain terms and methods related to animal production.	**AFNR.AS.1.E.a.1:** Communicate effectively utilizing disciplinary literacy.
AFNR.AS.1.F: Communicate and work effectively in animal science settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.AS.1.F.b.1:** Identify barriers to effective communication in animal science settings based on diverse backgrounds and abilities.	**AFNR.AS.1.F.i.1:** Develop plans to communicate and work effectively in animal science settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.AS.1.F.a.1:** Implement plans to communicate and work effectively in animal science settings with individuals and groups representing diverse backgrounds and abilities.

Standard: AFNR.AS.2

Students will classify, evaluate, select, and manage animals based on anatomical and physiological characteristics.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.2.A: Classify animals according to taxonomic classification systems and use.	**AFNR.AS.2.A.b.1:** Define "binomial nomenclature."	**AFNR.AS.2.A.i.1:** Explain the importance of the binomial nomenclature system for classifying animals.	**AFNR.AS.2.A.a.1:** Assess taxonomic characteristics, and classify animals according to the taxonomic classification system.
	AFNR.AS.2.A.b.2: Identify major uses of different animal species.	**AFNR.AS.2.A.i.2:** Compare and contrast major uses of different animal species.	**AFNR.AS.2.A.a.2:** Appraise and evaluate the economic value of animals for various applications in the agricultural industry.
	AFNR.AS.2.A.b.3: Identify domesticated animals by sight while using appropriate terminology.	**AFNR.AS.2.A.i.3:** Compare and contrast breed characteristics of an animal or animal product, and select correct classification terminology when referring to companion, production, and wild animals.	**AFNR.AS.2.A.a.3:** Apply knowledge of classification terms to communicate with others about animal systems in an effective and accurate manner.
AFNR.AS.2.B: Apply principles of comparative anatomy and physiology to uses within various animal systems.	**AFNR.AS.2.B.b.1:** Research and summarize characteristics of a typical animal cell, and identify the organelles.	**AFNR.AS.2.B.i.1:** Explain the functions of each animal-cell structure.	**AFNR.AS.2.B.a.1:** Correlate functions of animal-cell structures to animal growth, development, health, and reproduction.

Standard: AFNR.AS.2

Students will classify, evaluate, select, and manage animals based on anatomical and physiological characteristics.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.2.B: Apply principles of comparative anatomy and physiology to uses within various animal systems.	**AFNR.AS.2.B.b.2:** Identify basic functions of animal cells in growth and reproduction.	**AFNR.AS.2.B.i.2:** Explain the processes of meiosis and mitosis in animal growth, development, health, and reproduction.	**AFNR.AS.2.B.a.2:** Apply concepts of meiosis and mitosis to recognize relation to animal growth, development, health, and reproductive problems.
	AFNR.AS.2.B.b.3: Identify properties, locations, functions, and types of animal cells, tissues, organs, and body systems.	**AFNR.AS.2.B.i.3:** Compare and contrast animal cells, tissues, organs, and body-system types and functions among animal species.	**AFNR.AS.2.B.a.3:** Apply knowledge of anatomical and physiological characteristics of animals to make production and management decisions.
AFNR.AS.2.C: Select and train animals for specific purposes and maximum performance based on anatomy and physiology.	**AFNR.AS.2.C.b.1:** Identify anatomical and physiological characteristics of animals.	**AFNR.AS.2.C.i.1:** Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.	**AFNR.AS.2.C.a.1:** Evaluate and select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth, and reproduction.
	AFNR.AS.2.C.b.2: Identify anatomical and physiological disorders affecting animal performance.	**AFNR.AS.2.C.i.2:** Explain various anatomical and physiological disorders and their effects on animal performance.	**AFNR.AS.2.C.a.2:** Evaluate and implement appropriate preventive or treatment strategies for anatomical and physiological disorders affecting animal performance.

Standard: AFNR.AS.2

Students will classify, evaluate, select, and manage animals based on anatomical and physiological characteristics.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.2.C: Select and train animals for specific purposes and maximum performance based on anatomy and physiology.	**AFNR.AS.2.C.b.3:** Research and summarize the use of products and byproducts derived from animals.	**AFNR.AS.2.C.i.3:** Evaluate and select superior animals producing products based on industry standards.	**AFNR.AS.2.C.a.3:** Choose, implement, and evaluate sustainable and efficient procedures to produce consistently high-quality animals well suited for intended purposes.

Standard: AFNR.AS.3

Students will apply principles and practices of effective animal health care.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.3.A: Communicate effectively utilizing veterinary terminology.	**AFNR.AS.3.A.b.1:** Identify veterinary terminology.	**AFNR.AS.3.A.i.1:** Define words relating to veterinary terminology.	**AFNR.AS.3.A.a.1:** Effectively communicate utilizing veterinary terminology.

Standard: AFNR.AS.3

Students will apply principles and practices of effective animal health care.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.3.B: Demonstrate or recommend animal handling procedures to prevent hazards and increase the safety of humans and animals.	**AFNR.AS.3.B.b.1:** Identify tools and technology used in animal health management.	**AFNR.AS.3.B.i.1:** Describe and demonstrate the proper use and function of specific tools and technology related to animal health management.	**AFNR.AS.3.B.a.1:** Select and utilize tools and technology to meet specific animal health management goals.
	AFNR.AS.3.B.b.2: Identify hazards when working with animals.	**AFNR.AS.3.B.i.2:** Explain tools and methods utilized for safe animal handling to minimize hazards.	**AFNR.AS.3.B.a.2:** Demonstrate and recommend animal handling procedures to prevent hazards, taking into account the safety of humans and animals.
	AFNR.AS.3.B.b.3: Identify and explain methods of determining animal health and disorders.	**AFNR.AS.3.B.i.3:** Perform or explain simple animal health-check evaluations on and practice emergency response procedures related to animals.	**AFNR.AS.3.B.a.3:** Determine when animal health concerns need to be referred to an animal health professional.
	AFNR.AS.3.B.b.4: Identify characteristics of causal agenda and vectors of diseases and disorders in animals.	**AFNR.AS.3.B.i.4:** Research and analyze data to evaluate preventive measures for controlling and limiting the spread of diseases, parasites, and disorders among animals.	**AFNR.AS.3.B.a.4:** Design and implement a health-maintenance and a disease-and-disorder-prevention plan for animals in natural and confined environments.

Standard: AFNR.AS.3

Students will apply principles and practices of effective animal health care.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.3.B: Demonstrate or recommend animal handling procedures to prevent hazards and increase the safety of humans and animals.	**AFNR.AS.3.B.b.5:** Define best management practices in relation to animal care and welfare.	**AFNR.AS.3.B.i.5:** Discuss best management practices associated with managing animals.	**AFNR.AS.3.B.a.5:** Design and implement best management practices for specific situations.
AFNR.AS.3.C: Design programs to prevent animal diseases, parasites, and other disorders to ensure animal welfare.	**AFNR.AS.3.C.b.1:** Identify characteristics of wounds, common diseases, parasites and physiological disorders affecting animals.	**AFNR.AS.3.C.i.1:** Predict the diagnosis of illnesses and disorders of animals based on symptoms, and problems caused by wounds, diseases, parasites, and physiological disorders.	**AFNR.AS.3.C.a.1:** Recommend or demonstrate treatment for common diseases, parasites, and physiological disorders of animals according to directions prescribed by healthcare professionals.
	AFNR.AS.3.C.b.2: Identify and explain the clinical significance of common veterinary methods and treatments.	**AFNR.AS.3.C.i.2:** Assess safety and effectiveness of facilities and equipment used for surgical and nonsurgical veterinary treatments and procedures.	**AFNR.AS.3.C.a.2:** Propose surgical and nonsurgical veterinary treatments and procedures to meet specific animal healthcare objectives.
AFNR.AS.3.D: Recommend and demonstrate an animal health recordkeeping system.	**AFNR.AS.3.D.b.1:** Identify animal health recordkeeping systems.	**AFNR.AS.3.D.i.1:** Explore animal health recordkeeping systems.	**AFNR.AS.3.D.a.1:** Recommend and demonstrate animal health recordkeeping systems.
AFNR.AS.3.E: Analyze biosecurity measures utilized to protect welfare of humans and animals on a local, state, national, and global level.	**AFNR.AS.3.E.b.1:** Define biosecurity and explain the importance of biosecurity to the animal industry.	**AFNR.AS.3.E.i.1:** Analyze procedures at local, state, and national levels to ensure biosecurity of the animal industry (ex. premise ID program).	**AFNR.AS.3.E.a.1:** Design and evaluate a biosecurity plan for an animal operation.

Standard: AFNR.AS.3

Students will apply principles and practices of effective animal health care.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.3.E: Analyze biosecurity measures utilized to protect welfare of humans and animals on a local, state, national, and global level.	**AFNR.AS.3.E.b.2:** Identify and describe zoonotic diseases.	**AFNR.AS.3.E.i.2:** Analyze the health risk of zoonotic diseases to humans, and identify prevention methods.	**AFNR.AS.3.E.a.2:** Research and evaluate effectiveness of zoonotic disease prevention methods and procedures best suited to ensure public safety and animal welfare.
	AFNR.AS.3.E.b.3: Identify pharmaceuticals used to treat animals.	**AFNR.AS.3.E.i.3:** Analyze requirements for ethically and legally handling and distributing pharmaceuticals.	**AFNR.AS.3.E.a.3:** Apply knowledge of pharmacy laws to properly fill prescriptions.

Standard: AFNR.AS.4

Students will design and provide proper animal nutrition to achieve desired outcomes for performance, development, reproduction, and/or economic production.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.4.A: Analyze nutritional needs of animals.	**AFNR.AS.4.A.b.1:** Identify essential nutrients required for animal health, and explain each nutrient's specific roles in growth and performance.	**AFNR.AS.4.A.i.1:** Differentiate between nutritional needs of animals in different growth stages and production systems.	**AFNR.AS.4.A.a.1:** Assess nutritional needs for individual animals based on growth stage and production.

Standard: AFNR.AS.4

Students will design and provide proper animal nutrition to achieve desired outcomes for performance, development, reproduction, and/or economic production.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.4.A: Analyze nutritional needs of animals.	**AFNR.AS.4.A.b.2:** Differentiate between nutritional needs of animal species.	**AFNR.AS.4.A.i.2:** Correlate species nutritional needs to possible and available feedstuffs.	**AFNR.AS.4.A.a.2:** Design and defend a nutritional program by explaining relationships between nutrient requirements and feedstuffs provided.
AFNR.AS.4.B: Analyze feed rations, and assess if they meet nutritional needs of animals.	**AFNR.AS.4.B.b.1:** Compare and contrast common types of feedstuffs and nutrients provided in animal diets.	**AFNR.AS.4.B.i.1:** Analyze and calculate relative nutritional value of feedstuffs by evaluating general quality and condition.	**AFNR.AS.4.B.a.1:** Select appropriate feedstuffs for animals based on varying factors.
	AFNR.AS.4.B.b.2: Explain the importance of balanced rations for animals based on animal growth stage.	**AFNR.AS.4.B.i.2:** Appraise adequacy of feed rations using data from feedstuff analysis compared to animal requirements and performance.	**AFNR.AS.4.B.a.2:** Select and utilize animal feeds based on nutritional requirements, using rations for maximum nutrition and optimal economic production.
	AFNR.AS.4.B.b.3: Summarize purpose, impact, and mode of action of various feed additives and growth promotants in animal production.	**AFNR.AS.4.B.i.3:** Compare and contrast methods utilizing feed additives and growth promotants with production practices.	**AFNR.AS.4.B.a.3:** Make and defend decisions regarding feed additives and growth promotants based on scientific evidence, production system needs and goals, and input from industry professionals.

Standard: AFNR.AS.4

Students will design and provide proper animal nutrition to achieve desired outcomes for performance, development, reproduction, and/or economic production.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.4.C: Utilize industry tools to make animal nutrition decisions.	**AFNR.AS.4.C.b.1:** Identify and categorize tools and equipment used to meet animal nutritional needs and ensure a safe and abundant food supply.	**AFNR.AS.4.C.i.1:** Determine tools and equipment to perform animal nutrition tasks.	**AFNR.AS.4.C.a.1:** Select, evaluate and defend use of specific tools or equipment used to perform animal nutrition tasks.
	AFNR.AS.4.C.b.2: Identify parts of a feed label and meaning of various components of feed labels and feeding directions.	**AFNR.AS.4.C.i.2:** Analyze and apply information from a feed label and feeding directions to feed animals.	**AFNR.AS.4.C.a.2:** Evaluate and summarize potential impacts of compliance or noncompliance with feed label and feeding directions.
	AFNR.AS.4.C.b.3: Examine use of technology to provide animal nutrition.	**AFNR.AS.4.C.i.3:** Analyze technologies used to provide animal nutrition and summarize potential benefits and consequences.	**AFNR.AS.4.C.a.3:** Research and recommend technology improvements to provide proper nutrition to animals.

Standard: AFNR.AS.5

Students will apply principles of animal reproduction to achieve desired outcomes.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.5.A: Evaluate the male and female reproductive systems in selecting animals.	**AFNR.AS.5.A.b.1:** Identify male and female reproductive organs.	**AFNR.AS.5.A.i.1:** Explain the function of male and female reproductive organs of major animal species while using accurate terminology.	**AFNR.AS.5.A.a.1:** Select breeding animals based on functionality of reproductive organs.
AFNR.AS.5.B: Evaluate animals for breeding readiness and soundness.	**AFNR.AS.5.B.b.1:** Compare and contrast how age, size, life cycle, maturity level, and health status affect reproductive efficiency of male and female animals.	**AFNR.AS.5.B.i.1:** Assess and describe factors leading to reproductive maturity.	**AFNR.AS.5.B.a.1:** Evaluate and select animals for reproductive readiness.
	AFNR.AS.5.B.b.2: Summarize the importance of efficient and economic reproduction in animals.	**AFNR.AS.5.B.i.2:** Evaluate reproductive problems occurring in animals.	**AFNR.AS.5.B.a.2:** Treat or cull animals with reproductive problems.
AFNR.AS.5.C: Apply scientific principles in selection and breeding of animals.	**AFNR.AS.5.C.b.1:** Identify desired traits for specific animals.	**AFNR.AS.5.C.i.1:** Explain genetic inheritance in livestock and companion animals.	**AFNR.AS.5.C.a.1:** Predict advantages of using genetically superior animals in production of animals, animal products, or uses.
	AFNR.AS.5.C.b.2: Identify and summarize inheritance and terms related to inheritance in animal breeding.	**AFNR.AS.5.C.i.2:** Demonstrate determining probability trait inheritance in animals.	**AFNR.AS.5.C.a.2:** Select and evaluate breeding animals and determine probability of traits in their offspring.

Standard: AFNR.AS.5

Students will apply principles of animal reproduction to achieve desired outcomes.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.5.C: Apply scientific principles in selection and breeding of animals.	**AFNR.AS.5.C.b.3:** Identify and summarize genetic defects affecting animal performance.	**AFNR.AS.5.C.i.3:** Investigate ways DNA analysis can detect genetic defects in breeding stock.	**AFNR.AS.5.C.a.3:** Perform DNA analysis and use data to make and justify breeding decisions.
AFNR.AS.5.D: Compare and contrast scientific methods associated with animal reproduction.	**AFNR.AS.5.D.b.1:** Identify and categorize natural and artificial breeding methods.	**AFNR.AS.5.D.i.1:** Calculate potential economic benefits of natural versus artificial breeding methods.	**AFNR.AS.5.D.a.1:** Select animal breeding methods based on reproductive and economic efficiency in a given scenario.
	AFNR.AS.5.D.b.2: Identify and summarize advantages and disadvantages of major reproductive management practices, including but not limited to estrous synchronization and superovulation, flushing, and embryo transfer.	**AFNR.AS.5.D.i.2:** Analyze processes of major reproductive management practices, including but not limited to estrous synchronization, superovulation, flushing, and embryo transfer.	**AFNR.AS.5.D.a.2:** Create and evaluate plans and procedures for estrous synchronization, superovulation, flushing, embryo transfer, and other reproductive management practices.
	AFNR.AS.5.D.b.3: Explain the use of quantitative breeding values—EPD, performance records, and pedigrees—in the selection of genetically superior breeding animals.	**AFNR.AS.5.D.i.3:** Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value.	**AFNR.AS.5.D.a.3:** Select and assess animal performance based on quantitative breeding values for specific characteristics.
	AFNR.AS.5.D.b.4: Identify the materials and methods of reproductive management.	**AFNR.AS.5.D.i.4:** Analyze the materials, methods, and processes of reproductive management.	**AFNR.AS.5.D.a.4:** Demonstrate or communicate reproductive management techniques.

Standard: AFNR.AS.6

Students will prepare and implement animal handling procedures for safety of animals, producers and consumers of animal products.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.6.A: Demonstrate management techniques ensuring animal welfare.	**AFNR.AS.6.A.b.1:** Define and compare "animal rights" and "animal welfare."	**AFNR.AS.6.A.i.1:** Explore agencies and organizations employing these concepts.	**AFNR.AS.6.A.a.1:** Evaluate Quality Assurance Programs and Procedures for animal production (YQCA).
	AFNR.AS.6.A.b.2: Identify local, state, and national agencies and organizations supporting the animal industry.	**AFNR.AS.6.A.i.2:** Explain laws governing animal care and use.	**AFNR.AS.6.A.a.2:** Analyze community responsibility in options for caring for unwanted or neglected animals.
	AFNR.AS.6.A.b.3: Research animal training practices that promote and ensure animal welfare.	**AFNR.AS.6.A.i.3:** Analyze and document animal training practices and impact on animal welfare.	**AFNR.AS.6.A.a.3:** Design an animal training program with recommendations to increase the welfare of animals.
	AFNR.AS.6.A.b.4: List common behaviors of animals.	**AFNR.AS.6.A.i.4:** Discuss causes of common behaviors of animals, and determine if behaviors are normal or abnormal.	**AFNR.AS.6.A.a.4:** Anticipate behaviors in animals, and control them using safe practices for both humans and animals.
	AFNR.AS.6.A.b.5: Identify safe practices around animals.	**AFNR.AS.6.A.i.5:** Discuss and outline procedures for working with animals by species.	**AFNR.AS.6.A.a.5:** Demonstrate proper restraint and handling practices for specific animal species.

Standard: AFNR.AS.6

Students will prepare and implement animal handling procedures for safety of animals, producers and consumers of animal products.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.6.B: Implement procedures to ensure that animal products are safe.	**AFNR.AS.6.B.b.1:** Identify safety hazards affecting animal products.	**AFNR.AS.6.B.i.1:** Explain safety hazards affecting animal products.	**AFNR.AS.6.B.a.1:** Communicate consumer concerns with animal production practices relative to human health.
	AFNR.AS.6.B.b.2: Identify humane methods of harvesting animal products.	**AFNR.AS.6.B.i.2:** Compare and contrast humane methods of harvesting animal products.	**AFNR.AS.6.B.a.2:** Communicate cultural customs regarding animal harvesting.
	AFNR.AS.6.B.b.3: Identify biometric systems used with animals.	**AFNR.AS.6.B.i.3:** Describe how animal biometric systems can track animal activity.	**AFNR.AS.6.B.a.3:** Justify using animal "biometrics" to collect individual animal and farm data and the importance to producers and consumers.

Standard: AFNR.AS.7

Students will select animal facilities and equipment providing safe and efficient production, housing, and handling of animals.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.7.A: Design animal housing, equipment, and handling facilities.	**AFNR.AS.7.A.b.1:** Identify animal facilities and equipment used in animal husbandry.	**AFNR.AS.7.A.i.1:** Identify facilities needed to house and produce each animal species safely and efficiently.	**AFNR.AS.7.A.a.1:** Critique designs for an animal facility, and prescribe alternative layouts and adjustments for safe and efficient facility use.
	AFNR.AS.7.A.b.2: Identify and summarize equipment, technology, and handling-facility procedures used in modern animal production.	**AFNR.AS.7.A.i.2:** Analyze the use of modern equipment, technology, and handling-facility procedures, and determine if they enhance the safe, economic, and sustainable production of animals.	**AFNR.AS.7.A.a.2:** Select, use, and evaluate equipment, technology, and handling procedures to enhance sustainability and production efficiency.
AFNR.AS.7.B: Comply with government regulations and safety standards for facilities used in animal production.	**AFNR.AS.7.B.b.1:** Identify and summarize general standards required in facilities for animal production.	**AFNR.AS.7.B.i.1:** Analyze animal facilities to determine if standards have been met.	**AFNR.AS.7.B.a.1:** Evaluate facility designs and make recommendations ensuring standards for legal, safe, sustainable, ethical, economic, and efficient production of animals are met.

Standard: AFNR.AS.8

Students will analyze environmental factors associated with animal production.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.8.A: Reduce effects of animal production on the environment.	**AFNR.AS.8.A.b.1:** Identify and summarize effects of animal agriculture on the environment.	**AFNR.AS.8.A.i.1:** Assess effectiveness of methods to reduce animal agriculture impact on the environment.	**AFNR.AS.8.A.a.1:** Devise a plan including measures to reduce impact of animal agriculture on the environment.
AFNR.AS.8.B: Evaluate effects of environmental conditions on animals.	**AFNR.AS.8.B.b.1:** Research and summarize environmental conditions impacting animals.	**AFNR.AS.8.B.i.1:** Critique reliability and validity of evidence regarding effects of environmental conditions on animal populations and performance.	**AFNR.AS.8.B.a.1:** Apply valid and reliable research evidence to predict potential effects of environmental conditions for an animal population.

Standard: AFNR.AS.9

Students will gain agricultural skills through an animal pathway Supervised Agricultural Experience (SAE) Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.AS.9.A: Evaluate and implement steps and requirements to pursue a career opportunity in an AFNR career pathway.	**AFNR.AS.9.A.b.1:** Identify and summarize steps to pursue a career in an AFNR pathway.	**AFNR.AS.9.A.i.1:** Create a personal plan outlining goals and steps to obtain a career in AFNR pathway.	**AFNR.AS.9.A.a.1:** Evaluate progress toward AFNR career goals, and identify opportunities for improvement and necessary adjustments to individual career plan.
	AFNR.AS.9.A.b.2: Examine educational, training and experiential requirements to pursue a career in an AFNR pathway.	**AFNR.AS.9.A.i.2:** Analyze personal skill set and add to career plan options for attaining required education, training and experiences to obtain a career in an AFNR pathway.	**AFNR.AS.9.A.a.2:** Evaluate, update and improve a set of personal tools to reflect current skills, experiences, education, goals and complete processes needed to pursue and obtain a career in an AFNR pathway.
AFNR.AS.9.B: Examine and choose career opportunities matched to personal skills, talents, and career goals in AFNR pathway of interest.	**AFNR.AS.9.B.b.1:** Research and describe careers in each of the AFNR pathways and choose potential careers connecting to personal interests and skills.	**AFNR.AS.9.B.i.1:** Assemble and analyze examples of careers and related statistics on local, state, national, and global levels.	**AFNR.AS.9.B.a.1:** Conduct interviews with career professionals within the AFNR pathways and summarize the results.
AFNR.AS.9.C: Connect and apply academic learning, knowledge, and technical skills to solve problems through a Supervised Agriculture Experience (SAE).		**AFNR.AS.9.C.i.1:** Identify opportunities to apply cross-curricular academic learning and technical skills to an SAE.	**AFNR.AS.9.C.a.1:** Practice applying academic knowledge and technical skills in an SAE, and reflect on the results achieved.

Strand: Biotechnology (BT)

Standard: AFNR.BT.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of biotechnology systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.1.A: Distinguish major innovators, historical developments, and potential applications of biotechnology in agriculture.	**AFNR.BT.1.A.b.1.a:** Define "biotechnology." **AFNR.BT.1.A.b.1.b:** Identify examples of agricultural products and services created through biotechnology.	**AFNR.BT.1.A.i.1:** Examine current applications of biotechnology in agriculture.	**AFNR.BT.1.A.a.1:** Identify future technological needs in agriculture and possible responses through biotechnology innovation.
	AFNR.BT.1.A.b.2: Explore the historical impact of biotechnology on agriculture.	**AFNR.BT.1.A.i.2:** Create a timeline to explain the developmental progression of biotechnology.	**AFNR.BT.1.A.a.2:** Examine potential future applications of biotechnology in agriculture, and compare them with alternative approaches to improving agriculture.
AFNR.BT.1.B: Analyze ethical, legal, societal, and cultural issues relating to biotechnology.	**AFNR.BT.1.B.b.1:** Describe the role government agencies have on regulating biotechnology.	**AFNR.BT.1.B.i.1:** Summarize major regulatory issues related to biotechnology.	**AFNR.BT.1.B.a.1:** Compare benefits and risks associated with biotechnology research.
	AFNR.BT.1.B.b.2: Detail emergence, evolution, and implications of bioethics.	**AFNR.BT.1.B.i.2:** Determine the rationale people and groups use to either support or challenge breakthroughs in biotechnology.	**AFNR.BT.1.B.a.2:** Debate an ethical dilemma associated with biotechnology by identifying its components.

Standard: AFNR.BT.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of biotechnology systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.1.B: Analyze ethical, legal, societal, and cultural issues relating to biotechnology.	**AFNR.BT.1.B.b.3:** Explain the meaning of intellectual properties related to biotechnology.	**AFNR.BT.1.B.i.3:** Compare and contrast public versus private research in biotechnology.	**AFNR.BT.1.B.a.3:** Evaluate laboratory protocols regarding legal, societal, and cultural issues.
AFNR.BT.1.C: Evaluate the importance of the biotechnology industry, and understand the impact on local, national, and global economies.	**AFNR.BT.1.C.b.1:** Identify uses of biotechnology around the world.	**AFNR.BT.1.C.i.1:** Compare and contrast biotechnology applications around the world and the economic impact they have.	**AFNR.BT.1.C.a.1:** Investigate the implications biotechnology changes can have on the global economy.
AFNR.BT.1.D: Evaluate the impact of biotechnology on the environment.	**AFNR.BT.1.D.b.1:** Describe the use of biotechnology in bioremediation.	**AFNR.BT.1.D.i.1:** Compare and contrast the use of natural organisms and genetically engineered organisms in the removal of toxins from the environment.	**AFNR.BT.1.D.a.1:** Use a living organism to remove toxins from the environment.
	AFNR.BT.1.D.b.2: Examine the impact of biotechnology on native genomes and genetic diversity.	**AFNR.BT.1.D.i.2:** Identify research methods and laboratory procedures that reduce genomic impact to the environment.	**AFNR.BT.1.D.a.2:** Utilize research and laboratory procedures reducing genomic impact to the environment.
AFNR.BT.1.E: Explore science and nonscience fields and careers associated with biotechnology.	**AFNR.BT.1.E.b.1:** Cite career paths for various occupations in the biotechnology field.	**AFNR.BT.1.E.i.1:** Utilize the Internet, field trips, job fairs, interviews, and speakers to explore biotechnology.	**AFNR.BT.1.E.a.1:** Create a career plan for biotechnology.

Standard: AFNR.BT.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of biotechnology systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.1.F: Communicate effectively utilizing disciplinary literacy.	**AFNR.BT.1.F.b.1:** Identify terms and methods related to biotechnology.	**AFNR.BT.1.F.i.1:** Explain terms and methods related to biotechnology.	**AFNR.BT.1.F.a.1:** Communicate effectively utilizing disciplinary literacy.
AFNR.BT.1.G: Communicate and work effectively in biotechnology settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.BT.1.G.b.1:** Identify barriers to effective communication in biotechnology settings based on diverse backgrounds and abilities.	**AFNR.BT.1.G.i.1:** Develop plans to communicate and work effectively in biotechnology settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.BT.1.G.a.1:** Implement plans to communicate and work effectively in biotechnology settings with individuals and groups representing diverse backgrounds and abilities.

Standard: AFNR.BT.2

Students will apply major concepts of molecular biology and genetics to biotechnology applications.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.2.A: Demonstrate an understanding of microorganism identification and cellular physiology.	**AFNR.BT.2.A.b.1:** Describe the structure of a prokaryotic and eukaryotic cell.	**AFNR.BT.2.A.i.1.a:** Identify and explain bacterial properties useful in classification. **AFNR.BT.2.A.i.1.b:** Identify growth requirements for common microorganisms.	**AFNR.BT.2.A.a.1:** Identify methods to quantify microbial growth rates.
	AFNR.BT.2.A.b.2.a: Compare and contrast plant and animal cell structure. **AFNR.BT.2.A.b.2.b:** Identify the anatomy and structure of viruses.	**AFNR.BT.2.A.i.2:** Determine reasons for detecting microbes, and identify sources of microbes.	**AFNR.BT.2.A.a.2:** Distinguish between examples of helpful and harmful microbes as related to various applications.
	AFNR.BT.2.A.b.3: List products produced using fermentation.	**AFNR.BT.2.A.i.3:** Describe processes associated with lactate and alcoholic fermentation.	**AFNR.BT.2.A.a.3:** Produce products using fermentation processes.
AFNR.BT.2.B: Describe structure and function of proteins.	**AFNR.BT.2.B.b.1:** Describe and illustrate levels of protein structure.	**AFNR.BT.2.B.i.1:** Explain the relationship between structure and function of proteins.	**AFNR.BT.2.B.a.1:** Utilize models to visualize the three-dimensional structure of proteins.
AFNR.BT.2.C: Research the molecular basis for heredity.	**AFNR.BT.2.C.b.1:** State why DNA and proteins are needed by living organisms.	**AFNR.BT.2.C.i.1:** Explain why genotype influences` phenotype.	**AFNR.BT.2.C.a.1:** Create Punnett squares to demonstrate genetic heredity.

Standard: AFNR.BT.2

Students will apply major concepts of molecular biology and genetics to biotechnology applications.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.2.D: Explain the chemical structures of DNA and RNA.	**AFNR.BT.2.D.b.1.a:** Describe the structure of nucleic acids. **AFNR.BT.2.D.b.1.b:** Identify the components of nucleotides.	**AFNR.BT.2.D.i.1:** Compare and contrast the structure and functions of DNA and RNA.	**AFNR.BT.2.D.a.1:** Create a model of DNA or RNA.
AFNR.BT.2.E: Describe how DNA functions as a template for DNA replication.	**AFNR.BT.2.E.b.1:** Identify major components and outline the process of DNA replication.	**AFNR.BT.2.E.i.1:** Explain the process of DNA replication and how it applies to the amplification of nucleic acids in PCR and DNA sequencing.	**AFNR.BT.2.E.a.1:** Model the replication process of DNA.
AFNR.BT.2.F: Summarize the protein synthesis process.	**AFNR.BT.2.F.b.1.a:** Identify the major components, outline the process, and describe the products of transcription. **AFNR.BT.2.F.b.1.b:** Identify the major components, outline the process, and describe the product of translation.	**AFNR.BT.2.F.i.1:** Explain how transcription and translation coincide to synthesize protein.	**AFNR.BT.2.F.a.1.a:** Demonstrate the process of protein synthesis starting with DNA and ending with final proteins. **AFNR.BT.2.F.a.1.b:** Explain internal and external mechanisms controlling DNA activity.

Standard: AFNR.BT.3

Students will maintain a safe and sanitary biotechnology laboratory environment.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.3.A: Identify and describe hazards associated with biological and chemical materials.	**AFNR.BT.3.A.b.1:** Recognize and comply with labeling of chemicals used in a laboratory setting for safe handling and storage.	**AFNR.BT.3.A.i.1:** Coordinate a safe environment by properly identifying and disposing of laboratory waste.	**AFNR.BT.3.A.a.1:** Perform procedures with biological materials according to directions and with the appropriate biotechnology operating procedure.
AFNR.BT.3.B: Demonstrate appropriate use of personal protective equipment (PPE).	**AFNR.BT.3.B.b.1:** Describe how PPE protects the protocol and lab worker.	**AFNR.BT.3.B.i.1:** Demonstrate proper use of PPE.	**AFNR.BT.3.B.a.1:** Utilize proper PPE within a laboratory setting.
AFNR.BT.3.C: Construct a sanitary laboratory environment following sterile technique.	**AFNR.BT.3.C.b.1:** Explain appropriate sterilization methods.	**AFNR.BT.3.C.i.1.a:** Demonstrate proper aseptic and sterilizing procedures in the biotechnology laboratory. **AFNR.BT.3.C.i.1.b:** Work aseptically in a biotechnology laboratory. **AFNR.BT.3.C.i.1.c:** Sterilize equipment with an autoclave or other appropriate equipment.	**AFNR.BT.3.C.a.1:** Select and utilize proper aseptic and sterilizing procedures in the laboratory.
AFNR.BT.3.D: Demonstrate awareness of regulatory enforcement agencies, and adhere to regulations affecting biotechnology lab procedures.	**AFNR.BT.3.D.b.1:** Identify primary regulatory agencies overseeing biotechnology lab procedures.	**AFNR.BT.3.D.i.1:** Recognize key regulations affecting biotechnology lab procedures.	**AFNR.BT.3.D.a.1:** Carry out procedures in the biotechnology laboratory following all regulations.

Standard: AFNR.BT.4

Students will use a variety of laboratory tools and equipment to prepare biotechnology solutions and media.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.4.A: Demonstrate accurate and correct measurements.	**AFNR.BT.4.A.b.1.a:** Correctly label reagents. **AFNR.BT.4.A.b.1.b:** Use balance or other appropriate equipment to weigh substances.	**AFNR.BT.4.A.i.1:** Measure and dispense liquids with various type of pipettes.	**AFNR.BT.4.A.a.1:** Select proper lab equipment and equipment size and calibrations to measure reagents used in biotechnology protocols.
	AFNR.BT.4.A.b.2.a: Use a balance to weigh substances. **AFNR.BT.4.A.b.2.b:** Utilize the metric system, common conversions, and proper units of measurement.	**AFNR.BT.4.A.i.2:** Measure acidity and alkalinity.	**AFNR.BT.4.A.a.2:** Perform accurate measurements as part of a lab procedure.
AFNR.BT.4.B: Formulate solutions and media preparations.	**AFNR.BT.4.B.b.1:** Incubate substances with conventional and shaking water baths.	**AFNR.BT.4.B.i.1.a:** Apply acid-base chemistry, pH scale, and buffer properties. **AFNR.BT.4.B.i.1.b:** Determine and adjust the pH of solutions with commonly used acids and bases.	**AFNR.BT.4.B.a.1:** Prepare solutions of defined concentrations and pH.

Standard: AFNR.BT.4

Students will use a variety of laboratory tools and equipment to prepare biotechnology solutions and media.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.4.B: Formulate solutions and media preparations.		**AFNR.BT.4.B.i.2:** Separate heterogenous substances into their various components.	**AFNR.BT.4.B.a.2:** Use appropriate media preparation for specific protocols.
		AFNR.BT.4.B.i.3.a: Calculate concentrations of solutions. **AFNR.BT.4.B.i.3.b:** Calculate dilutions of stock solutions to make working solutions.	**AFNR.BT.4.B.a.3:** Determine concentrations using a spectrophotometer.
AFNR.BT.4.C: Prepare documentation maintaining preparation traceability of solution and media formulations and product origins.	**AFNR.BT.4.C.b.1:** Identify importance of traceability of solution, media formulations, and product origins in biotechnology lab work.	**AFNR.BT.4.C.i.1:** Take accurate notes regarding solutions, media formulations, and product origins while working in the biotechnology lab.	**AFNR.BT.4.C.a.1:** Duplicate lab procedures and protocols using documentation regarding solution and media formulations.
AFNR.BT.4.D: Use recommended procedures in calibrating, verifying performance, and troubleshooting commonly used equipment in the biotechnology lab.	**AFNR.BT.4.D.b.1:** Identify procedures used in calibrating, verifying performance, and troubleshooting commonly used equipment in the biotechnology lab.	**AFNR.BT.4.D.i.1:** Compare and contrast procedures in calibrating, verifying performance, and troubleshooting commonly used equipment in the biotechnology lab.	**AFNR.BT.4.D.a.1:** Select and utilize a procedure to calibrate, verify performance, or troubleshoot a piece of commonly used equipment in the biotechnology lab.

Standard: AFNR.BT.5

Students will use advanced biotechnology procedures to conduct analysis and research.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.5.A: Create and maintain bacterial, animal, and plant cultures.	**AFNR.BT.5.A.b.1.a:** Label specimens correctly. **AFNR.BT.5.A.b.1.b:** Examine specimens with a microscope.	**AFNR.BT.5.A.i.1.a:** Create a bacterial slide. **AFNR.BT.5.A.i.1.b:** Stain and examine eukaryotic cells.	**AFNR.BT.5.A.a.1:** Isolate, maintain, and quantify cell cultures.
	AFNR.BT.5.A.b.2.a: Perform various bacterial culture inoculation techniques. **AFNR.BT.5.A.b.2.b:** Use an incubator to grow bacterial cultures.	**AFNR.BT.5.A.i.2:** Perform gram stains to identify bacteria.	**AFNR.BT.5.A.a.2:** Use growth chambers to culture plant and animal cells and tissue.
AFNR.BT.5.B: Perform protein separation and purification techniques, and interpret results.	**AFNR.BT.5.B.b.1.a:** Identify ways proteins are used in biotechnology. **AFNR.BT.5.B.b.1.b:** Extract DNA from various animal and plant cells.	**AFNR.BT.5.B.i.1:** List and describe methods to determine quantity and quality of extracted or target DNA production.	**AFNR.BT.5.B.a.1.a:** Perform protein purification using chromatography. **AFNR.BT.5.B.a.1.b:** Conduct or model an enzyme-linked immunosorbent assay (ELISA).

Standard: AFNR.BT.5

Students will use advanced biotechnology procedures to conduct analysis and research.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.5.C: Use genetic transformation techniques, and describe genetic engineering processes.	**AFNR.BT.5.C.b.1:** Explain plant or animal genetic engineering techniques.	**AFNR.BT.5.C.i.1.a:** Summarize reproductive biotechnology techniques. **AFNR.BT.5.C.i.1.b:** Compare and contrast nuclear transfer of embryos and embryo splitting.	**AFNR.BT.5.C.a.1.a:** Describe or perform methods of producing transgenic plants. **AFNR.BT.5.C.a.1.b:** Diagram the process and describe the techniques used to produce transgenic eukaryotic and prokaryotic cell.
	AFNR.BT.5.C.b.2: Describe the basics of gene editing technology.	**AFNR.BT.5.C.i.2:** Apply gene editing technology to a biotechnology issue.	**AFNR.BT.5.C.a.2:** Describe or demonstrate the process gene editing technology utilizes to precisely edit genetic material.
	AFNR.BT.5.C.b.3: Identify DNA sequencing techniques.	**AFNR.BT.5.C.i.3:** Examine the role the epigenome has on gene expression.	**AFNR.BT.5.C.a.3:** Research the implications epigenetics has on gene expression and how this connects to DNA sequencing.
	AFNR.BT.5.C.b.4: Differentiate types of natural vector organisms, and demonstrate how to use them safely.		**AFNR.BT.5.C.a.4:** Utilize a natural vector for a biotechnology application.

Standard: AFNR.BT.5

Students will use advanced biotechnology procedures to conduct analysis and research.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.5.C: Use genetic transformation techniques, and describe genetic engineering processes.	**AFNR.BT.5.C.b.5:** Describe how antibodies are formed and how they are used in biotechnology applications.		**AFNR.BT.5.C.a.5:** Utilize antibodies in a biotechnology application.
	AFNR.BT.5.C.b.6.a: Describe the elements of a functional plasmid vector. **AFNR.BT.5.C.b.6.b:** Explain the role of restriction enzymes in generating recombinant plasmids.	**AFNR.BT.5.C.i.6.a:** Analyze protocol for isolating plasmid DNA. **AFNR.BT.5.C.i.6.b:** Utilize restriction enzymes to cut DNA fragments and plasmids.	**AFNR.BT.5.C.a.6:** Perform bacterial transformation, and analyze results.
AFNR.BT.5.D: Use DNA restriction analysis to locate genes and/or measure DNA and RNA fragments.	**AFNR.BT.5.D.b.1:** Identify the relationship between DNA and gene expression with respect to base-pair sequences.	**AFNR.BT.5.D.i.1:** Isolate and purify target DNA.	**AFNR.BT.5.D.a.1.a:** Amplify and analyze the production of target DNA. **AFNR.BT.5.D.a.1.b:** Assess DNA sequences using a bioinformatics computer application.
	AFNR.BT.5.D.b.2: Explain the principles used to separate DNA fragments.	**AFNR.BT.5.D.i.2:** Separate DNA and RNA fragments.	**AFNR.BT.5.D.a.2.a:** Perform restriction digests and interpret fragmentation patterns.

Standard: AFNR.BT.5

Students will use advanced biotechnology procedures to conduct analysis and research.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.5.D: Use DNA restriction analysis to locate genes and/or measure DNA and RNA fragments.			**AFNR.BT.5.D.a.2.b:** Use ladders, markers, and knowns to calculate the base-pair size of DNA and RNA fragments.
AFNR.BT.5.E: Generate a sound and productively designed lab report.	**AFNR.BT.5.E.b.1:** Identify a research problem or question.	**AFNR.BT.5.E.i.1.a:** Develop a properly formatted hypothesis testing a problem/question. **AFNR.BT.5.E.i.1.b:** Determine methodology of a procedural set (purpose of individual steps within a protocol).	**AFNR.BT.5.E.a.1.a:** Communicate research design and summary with others. **AFNR.BT.5.E.a.1.b:** Design laboratory protocols accurately and in sequence.
	AFNR.BT.5.E.b.2.a: Describe qualitative data for an experiment. **AFNR.BT.5.E.b.2.b:** Describe quantitative data for an experiment.	**AFNR.BT.5.E.i.2:** Analyze data to determine if a hypothesis is acceptable, rejectable, or inconclusive.	**AFNR.BT.5.E.a.2.a:** Analyze the strengths of research based on data and procedures, and propose future investigations. **AFNR.BT.5.E.a.2.b:** Defend conclusion statements with data.
AFNR.BT.5.F: Assess risks associated with biotechnology research and procedures.	**AFNR.BT.5.F.b.1:** Identify pros and cons of biotechnology research and procedures.	**AFNR.BT.5.F.i.1:** Use decision-making models to assess risks associated with biotechnology research and procedures.	**AFNR.BT.5.F.a.1:** Select and defend a biotechnology procedure or choice to not use the procedure identifying the key risks associated with either option.

Standard: AFNR.BT.6

Students will gain agricultural skills through a Biotechnology Supervised Agricultural Experience (SAE) Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.6.A: Evaluate and implement steps and requirements to pursue a career opportunity in an AFNR career pathway.	**AFNR.BT.6.A.b.1:** Identify and summarize steps to pursue a career in an AFNR pathway.	**AFNR.BT.6.A.i.1:** Create a personal plan outlining goals and steps to obtain a career in an AFNR pathway.	**AFNR.BT.6.A.a.1:** Evaluate progress toward AFNR career goals, and identify opportunities for improvement and necessary adjustments to an individual career plan.
	AFNR.BT.6.A.b.2: Examine educational, training, and experiential requirements to pursue a career in an AFNR pathway.	**AFNR.BT.6.A.i.2:** Analyze personal skill set and add to career plan options for attaining required education, training, and experiences to obtain a career in an AFNR pathway.	**AFNR.BT.6.A.a.2:** Evaluate, update, and improve a set of personal tools to reflect current skills, experiences, education, and goals, and complete processes needed to pursue and obtain a career in an AFNR pathway.
AFNR.BT.6.B: Examine and choose career opportunities matched to personal skills, talents, and career goals in an AFNR pathway of interest.	**AFNR.BT.6.B.b.1:** Research and describe careers in each of the AFNR pathways, and choose potential careers connecting to personal interests and skills.	**AFNR.BT.6.B.i.1:** Assemble and analyze examples of careers and related statistics on local, state, national, and global levels.	**AFNR.BT.6.B.a.1:** Conduct interviews with career professionals within the AFNR pathways, and summarize the results.

Standard: AFNR.BT.6

Students will gain agricultural skills through a Biotechnology Supervised Agricultural Experience (SAE) Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.BT.6.C: Connect and apply academic learning, knowledge, and technical skills to solve problems through a Supervised Agriculture Experience (SAE).		**AFNR.BT.6.C.i.1:** Identify opportunities to apply cross-curricular academic learning and technical skills to an SAE.	**AFNR.BT.6.C.a.1:** Practice applying academic knowledge and technical skills in an SAE, and reflect on the results achieved.

Strand: Environmental and Natural Resources (ENR)

Standard: AFNR.ENR.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of environmental and natural resources pathways.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.1.A: Apply knowledge of natural resource and environmental components to the management of environmental and natural resources systems.	**AFNR.ENR.1.A.b.1:** Identify natural resources.	**AFNR.ENR.1.A.i.1:** Differentiate between renewable and nonrenewable natural resources.	**AFNR.ENR.1.A.a.1:** Research and debate one or more current issues related to conservation or preservation of natural resources.
	AFNR.ENR.1.A.b.2: Define "ecosystem" and related terms.	**AFNR.ENR.1.A.i.2:** Compare and contrast different ecosystems.	**AFNR.ENR.1.A.a.2:** Compare and contrast interdependence of organisms within an ecosystem.
AFNR.ENR.1.B: Apply knowledge of historical and cultural development of management of environmental and natural resources systems.	**AFNR.ENR.1.B.b.1.a:** Identify ways people are dependent on natural resources and how access to resources can lead to conflict and cooperation. **AFNR.ENR.1.B.b.1.b:** Identify rule makers and why rules are made related to the environment.	**AFNR.ENR.1.B.i.1:** Compare and contrast roles of government at local, state, tribal, national, and international levels in setting and enforcing environmental policies and encouraging sustainability.	**AFNR.ENR.1.B.a.1:** Assess roles of individuals, government, and special interest groups in setting policies at local, state, tribal, national, and international levels.

Standard: AFNR.ENR.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of environmental and natural resources pathways.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.1.B: Apply knowledge of historical and cultural development of management of environmental and natural resources systems.	**AFNR.ENR.1.B.b.2:** Explore the history of conservation in the United States and Wisconsin.	**AFNR.ENR.1.B.i.2:** Investigate how Wisconsin's natural resource systems have shaped the state's cultural systems.	**AFNR.ENR.1.B.a.2:** Analyze cultural and environmental dimensions of a policy, and propose a strategy to address concerns related to the policy.
AFNR.ENR.1.C: Explore global implications of management of environmental and natural resources systems.	**AFNR.ENR.1.C.b.1:** Identify global management strategies of environmental and natural resources systems.	**AFNR.ENR.1.C.i.1:** Investigate how varying management strategies may impact the environmental and natural resources systems across the globe.	**AFNR.ENR.1.C.a.1:** Research and debate the selection of one management strategy over another based on the impacts that may be seen across the globe.
AFNR.ENR.1.D: Explore future trends of management of environmental and natural resources systems.	**AFNR.ENR.1.D.b.1:** Identify management systems of environmental and natural resources systems.	**AFNR.ENR.1.D.i.1:** Investigate how management trends have evolved over time.	**AFNR.ENR.1.D.a.1:** Make predictions on future management trends in environmental and natural resources systems.
AFNR.ENR.1.E: Explore career fields and opportunities of management of environmental and natural resources systems.	**AFNR.ENR.1.E.b.1:** Identify careers related to environmental and natural resources systems.	**AFNR.ENR.1.E.i.1:** Examine careers related to environmental and natural resources systems.	**AFNR.ENR.1.E.a.1:** Develop career plans related to environmental and natural resources systems.

Standard: AFNR.ENR.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of environmental and natural resources pathways.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.1.F: Communicate and work effectively in environmental and natural resource settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.ENR.1.F.b.1:** Identify barriers to effective communication in environmental and natural resource settings based on diverse backgrounds and abilities.	**AFNR.ENR.1.F.i.1:** Develop plans to communicate and work effectively in environmental and natural resource settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.ENR.1.F.a.1:** Implement plans to communicate and work effectively in environmental and natural resource settings with individuals and groups representing diverse backgrounds and abilities.

Standard: AFNR.ENR.2

Students will apply ecological concepts for sustainable natural resources management and service systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.2.A: Explore earth's major ecosystems.	**AFNR.ENR.2.A.b.1:** Identify earth's major ecosystems.	**AFNR.ENR.2.A.i.1:** Compare and contrast earth's major ecosystems.	**AFNR.ENR.2.A.a.1:** Investigate what contributes to the differences within various ecosystems such as elevation, latitude, etc.

Standard: AFNR.ENR.2

Students will apply ecological concepts for sustainable natural resources management and service systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.2.B: Describe human impact on ecosystems.	**AFNR.ENR.2.B.b.1:** Explain human impact on ecosystems.	**AFNR.ENR.2.B.i.1:** Compare and contrast ecosystems with and without humans.	**AFNR.ENR.2.B.a.1:** Investigate carbon footprints created by humans and debate the effect they have on ecosystems.
AFNR.ENR.2.C: Describe flow of energy through an ecosystem.	**AFNR.ENR.2.C.b.1.a:** List components of nutrient cycles. **AFNR.ENR.2.C.b.1.b:** Explain methods organisms use to decompose plant and animal matter.	**AFNR.ENR.2.C.i.1:** Investigate the flow of energy and nutrients through an ecosystem.	**AFNR.ENR.2.C.a.1:** Model the flow of energy within an ecosystem using an energy pyramid or similar structure.
AFNR.ENR.2.D: Apply knowledge of biodiversity to natural resources management decisions.	**AFNR.ENR.2.D.b.1:** Define biodiversity related to natural resources.	**AFNR.ENR.2.D.i.1:** Investigate the impact of removing biodiversity from an ecosystem.	**AFNR.ENR.2.D.a.1:** Debate the impact of changes to biodiversity.
AFNR.ENR.2.E: Explain interdependence and relationships of species in ecosystems.	**AFNR.ENR.2.E.b.1.a:** Define "symbiosis" and the role it plays in the interaction between species. **AFNR.ENR.2.E.b.1.b:** Define "mutualism," "commensalism," "parasitism," and "competition."	**AFNR.ENR.2.E.i.1:** Investigate examples of symbiosis in varying ecosystems.	**AFNR.ENR.2.E.a.1:** Predict the impact that elimination of a species can have on other species in an ecosystem.

Standard: AFNR.ENR.2

Students will apply ecological concepts for sustainable natural resources management and service systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.2.F: Examine historic extinctions, and relate them to current rare, threatened, and endangered plants and animals.	**AFNR.ENR.2.F.b.1:** Classify animals into the following categories: rare, threatened, and endangered plants and animals.	**AFNR.ENR.2.F.i.1:** Analyze historic extinctions and current rare, threatened, and endangered plants and animals.	**AFNR.ENR.2.F.a.1:** Develop a plan to prevent further extinction or endangerment of plants and animals.
AFNR.ENR.2.G: Examine application of conservation versus preservationist natural resource management decisions.	**AFNR.ENR.2.G.b.1:** Explain "conservation" and "preservation."	**AFNR.ENR.2.G.i.1:** Compare and contrast conservation and preservation.	**AFNR.ENR.2.G.a.1:** Develop a conservation plan for natural resource management decisions.

Standard: AFNR.ENR.3

Students will analyze and protect atmospheric natural resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.3.A: Determine the role of the atmosphere in sustaining life.	**AFNR.ENR.3.A.b.1:** Identify the role the atmosphere plays in the water cycle, carbon cycle, and climate.	**AFNR.ENR.3.A.i.1:** Analyze the purpose of each part of the atmosphere.	**AFNR.ENR.3.A.a.1:** Create a model diagraming the interrelationship of the atmosphere.
AFNR.ENR.3.B: Understand ecological and health implications of poor air quality and apply knowledge to prevent air pollution.	**AFNR.ENR.3.B.b.1:** Identify causes of poor air quality.	**AFNR.ENR.3.B.i.1:** Examine the health and ecological implications of poor air quality.	**AFNR.ENR.3.B.a.1:** Develop a plan to increase air quality and reduce air pollution.
AFNR.ENR.3.C: Examine effects and list human activities contributing to changes in the climate.	**AFNR.ENR.3.C.b.1.a**: Identify changes in the climate. **AFNR.ENR.3.C.b.1.b:** Distinguish weather from climate.	**AFNR.ENR.3.C.i.1:** Classify human activities contributing to changes in the climate.	**AFNR.ENR.3.C.a.1.a:** Predict the effects of humans on the climate. **AFNR.ENR.3.C.a.1.b:** Develop a plan to reduce the effects of humans on the climate.
AFNR.ENR.3.D: Examine the impact changes in climate have on the world.	**AFNR.ENR.3.D.b.1:** Identify how changes in the climate have impacted environments and the organisms and natural resources within them.	**AFNR.ENR.3.D.i.1:** Analyze the impact changes in the climate have created.	**AFNR.ENR.3.D.a.1:** Predict the impact continued changes in the climate will have on environments and the organisms and natural resources within them.

Standard: AFNR.ENR.4

Students will apply scientific and sustainable practices to soil and land resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.4.A: Examine soil characteristics.	**AFNR.ENR.4.A.b.1:** Define "soil."	**AFNR.ENR.4.A.i.1:** Classify soil, and compare and contrast different soil types.	**AFNR.ENR.4.A.a.1.a:** Organize soil samples by soil types. **AFNR.ENR.4.A.a.1.b:** Compare how physical qualities of soil influence infiltration and percolation of water.
	AFNR.ENR.4.A.b.2: Determine how soil is formed.	**AFNR.ENR.4.A.i.2:** Detail the process of soil formation in a region.	**AFNR.ENR.4.A.a.2:** Analyze the impact of humans on soil formation.
	AFNR.ENR.4.A.b.3: Define weathering and how it affects soil formation.	**AFNR.ENR.4.A.i.3:** Examine the major weathering forces.	**AFNR.ENR.4.A.a.3:** Design visual examples of weathering-force types.
AFNR.ENR.4.B: Identify soil erosion and impacts to environmental and natural resources systems.	**AFNR.ENR.4.B.b.1.a:** Define "soil erosion." **AFNR.ENR.4.B.b.1.b:** List types of soil erosion. **AFNR.ENR.4.B.b.1.c:** Recognize the impact of soil erosion.	**AFNR.ENR.4.B.i.1:** Investigate agricultural practices preventing soil erosion.	**AFNR.ENR.4.B.a.1:** Utilize agricultural practices preventing soil erosion.

Standard: AFNR.ENR.4

Students will apply scientific and sustainable practices to soil and land resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.4.C: Research rangeland management.	**AFNR.ENR.4.C.b.1:** Identify characteristics of a healthy rangeland.	**AFNR.ENR.4.C.i.1:** Illustrate a healthy rangeland.	**AFNR.ENR.4.C.a.1:** Summarize methods of rangeland improvement.
AFNR.ENR.4.D: Identify safe disposal of solid waste.	**AFNR.ENR.4.D.b.1:** Identify the role of soil types used in landfills.	**AFNR.ENR.4.D.i.1:** Explain attenuation and how it impacts landfills.	**AFNR.ENR.4.D.a.1:** Explain, evaluate, and model basic sanitary landfill operating procedures and designs.
	AFNR.ENR.4.D.b.2: Define "solid waste," "municipal waste," "industrial solid waste," and their sources.	**AFNR.ENR.4.D.i.2:** Compare and contrast solid waste, municipal solid waste, and industrial solid waste.	**AFNR.ENR.4.D.a.2:** Estimate the current and future impact of municipal solid waste on society.
	AFNR.ENR.4.D.b.3: Identify different types of landfills.	**AFNR.ENR.4.D.i.3:** Hypothesize and research the impact of solid waste, municipal solid waste, and industrial solid waste.	**AFNR.ENR.4.D.a.3:** Evaluate and analyze environmental hazards created by different types of solid waste, solid waste accumulation, and solid waste disposal.
	AFNR.ENR.4.D.b.4: Describe how items decay in nature.	**AFNR.ENR.4.D.i.4:** Define "composts" and "composting."	**AFNR.ENR.4.D.a.4:** Explain and evaluate scientific operating principles of composting facilities.

Standard: AFNR.ENR.4

Students will apply scientific and sustainable practices to soil and land resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.4.E: Define types of land use planning and their impacts on the environment and human activity.	**AFNR.ENR.4.E.b.1:** Locate parks or public locations using the USDA Web Soil Survey land-use planning tool.	**AFNR.ENR.4.E.i.1.a:** Use USDA Web Soil Survey to gather information on land use and soil types. **AFNR.ENR.4.E.i.1.b:** Use a soil survey to determine land capability classes for different parcels of land in an area.	**AFNR.ENR.4.E.a.1.a:** Construct an example land-use plan using the USDA Web Soil Survey. **AFNR.ENR.4.E.a.1.b:** Design a master land-use management plan for a given area utilizing land capability classes to minimize erosion and flooding while maximizing development and preservation of topsoil.
AFNR.ENR.4.F: Describe the organization of public and private land systems, governance, recording, and measurement.	**AFNR.ENR.4.F.b.1:** Identify the organizations related to land systems, governance, recording, and measurement.	**AFNR.ENR.4.F.i.1:** Explain the role each organization has in the sustainable practice of soil and land resources.	**AFNR.ENR.4.F.a.1:** Debate the level of involvement each organization should have in sustainability.
		AFNR.ENR.4.F.i.2: Discuss the organization of legal land descriptions and land ownership in county plat books, survey maps, and other ownership tracking systems.	**AFNR.ENR.4.F.a.2:** Interpret land location using legal land descriptions.

Standard: AFNR.ENR.5

Students will analyze and manage hydrology resources, quality, and usage.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.5.A: Summarize water supply and water uses.	**AFNR.ENR.5.A.b.1:** Summarize parts of a watershed.	**AFNR.ENR.5.A.i.1:** Describe properties of watersheds, and identify boundaries of local watersheds.	**AFNR.ENR.5.A.a.1:** Relate function of watersheds to natural resources.
	AFNR.ENR.5.A.b.2: Diagram a hydrologic cycle.	**AFNR.ENR.5.A.i.2:** Correlate the impact of solar energy on the hydrologic cycle.	**AFNR.ENR.5.A.a.2:** Model the movement of water through the hydrologic cycle.
	AFNR.ENR.5.A.b.3: Match groundwater and surface-water flow to sources.	**AFNR.ENR.5.A.i.3:** Compare and contrast groundwater and surface-water flow.	**AFNR.ENR.5.A.a.3:** Explain stream hydrology and structure, and determine different classes of streams.
	AFNR.ENR.5.A.b.4: Define "lakes," "rivers," and "oceans."	**AFNR.ENR.5.A.i.4:** Examine how lakes, rivers, and oceans are influenced by climate, topography, and organisms.	**AFNR.ENR.5.A.a.4:** Compare aquatic ecosystems and their relation to water supply and uses.
	AFNR.ENR.5.A.b.5: List the greatest water users.	**AFNR.ENR.5.A.i.5:** Research the student water footprint, and compare to the United States population.	**AFNR.ENR.5.A.a.5:** Assess the student water footprint, and compare to global populations.
AFNR.ENR.5.B: Determine priorities in sustainable water-use planning.	**AFNR.ENR.5.B.b.1:** Identify high water usage, and find solutions to water shortages.	**AFNR.ENR.5.B.i.2:** Determine best practices to have a sustainable water supply.	**AFNR.ENR.5.B.a.3:** Create a call-to-action plan to keep Wisconsin water sustainable.

Standard: AFNR.ENR.5

Students will analyze and manage hydrology resources, quality, and usage.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.5.C: Define and describe "water purification" and "wastewater treatment practices."	**AFNR.ENR.5.C.b.1:** Identify the laws and regulations associated with water purification.	**AFNR.ENR.5.C.i.1:** Identify the steps of the water purification process for wastewater.	**AFNR.ENR.5.C.a.1:** Diagram wastewater treatment.
AFNR.ENR.5.D: Protect and improve surface water quality.	**AFNR.ENR.5.D.b.1:** Name tests indicating water quality.	**AFNR.ENR.5.D.i.1:** Describe parameters indicating water quality.	**AFNR.ENR.5.D.a.1:** Test water quality and analyze results.
AFNR.ENR.5.E: Apply best management practices to protect and improve wetland management based on classification and function.	**AFNR.ENR.5.E.b.1:** Define "wetlands," and list reasons why they are important.	**AFNR.ENR.5.E.i.1:** Describe the functions of wetlands, and differentiate types of wetlands.	**AFNR.ENR.5.E.a.1:** Explain criteria for classifying wetlands while applying the Hydrogeomorphic (HGM) Approach and National Wetland Inventories (NWI) to determine classification of local wetlands.
	AFNR.ENR.5.E.b.2: Compare and contrast what organisms might live in a wetland versus other habitats.	**AFNR.ENR.5.E.i.2:** Identify major types of living organisms that inhabit wetlands.	**AFNR.ENR.5.E.a.2:** Identify techniques used to evaluate a wetland, record conditions of a local wetland followed by application of proper techniques used to manage, create, and restore a wetland.

Standard: AFNR.ENR.5

Students will analyze and manage hydrology resources, quality, and usage.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.5.E: Apply best management practices to protect and improve wetland management based on classification and function.	**AFNR.ENR.5.E.b.3:** List ways to improve a wetland.	**AFNR.ENR.5.E.i.3:** Explain the importance of wetland management, creation, enhancement, and restoration programs.	**AFNR.ENR.5.E.a.3:** Analyze the importance of roles played by wetlands in regard to water availability, prevention of flooding, and other factors.
AFNR.ENR.5.F: Apply knowledge of aquifers to protect groundwater quality.	**AFNR.ENR.5.F.b.1:** Define aquifers, and list the main aquifers in Wisconsin.	**AFNR.ENR.5.F.i.1:** Identify major aquifer pollutants.	**AFNR.ENR.5.F.a.1:** Analyze the effects of pollution on aquifers, and assess the amount of time it would take to fix the pollution issues.

Standard: AFNR.ENR.6

Students will apply scientific and sustainable practices to forest resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.6.A: Understand general tree anatomy and physiology principles related to tree growth.	**AFNR.ENR.6.A.b.1:** Describe the life cycle of a tree and factors affecting photosynthesis and respiration.	**AFNR.ENR.6.A.i.1:** Identify silvicultural practices and their relationship to tree growth.	**AFNR.ENR.6.A.a.1:** Create a management plan for a tree species optimizing tree growth and quality.

Standard: AFNR.ENR.6

Students will apply scientific and sustainable practices to forest resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.6.B: Define "forest" and "forest regions" in the United States and Wisconsin.	**AFNR.ENR.6.B.b.1:** Identify native and introduced tree species common to Wisconsin.	**AFNR.ENR.6.B.i.1:** Identify major forest regions in the United States and Wisconsin and the tree species found in each.	**AFNR.ENR.6.B.a.1:** Evaluate the factors that influence the differences between forest regions.
AFNR.ENR.6.C: Relate function of urban forests to wildlife habitat, water quality, air quality, and recreation.	**AFNR.ENR.6.C.b.1:** Define "urban forestry."	**AFNR.ENR.6.C.i.1:** Discuss urban forestry benefits and disadvantages related to wildlife habitat, water quality, air quality, and recreation.	**AFNR.ENR.6.C.a.1:** Develop a management plan for an urban forest.
AFNR.ENR.6.D: Manage forests and woodlands for wildlife habitat and timber production.	**AFNR.ENR.6.D.b:** Identify goals of forest management based on the type of production expected of the specific forest.	**AFNR.ENR.6.D.i:** Compare and contrast management techniques based on the production goals of a forest.	**AFNR.ENR.6.D.a:** Create a management plan to achieve production goals of a given forest..
AFNR.ENR.6.E: Use tools and methods to measure tree growth and forest land cover.	**AFNR.ENR.6.E.b.1:** Understand how tools are used to measure tree volume.	**AFNR.ENR.6.E.i.1.a:** Calculate the board foot of a tree. **AFNR.ENR.6.E.i.1.b:** Describe timber cruising methods to estimate tree volume and land cover.	**AFNR.ENR.6.E.a.1:** Create and use a Biltmore stick to measure trees.
		AFNR.ENR.6.E.i.2: Identify tools used to measure and manage tree growth.	**AFNR.ENR.6.E.a.2:** Use a clinometer to measure tree volume.

Standard: AFNR.ENR.6

Students will apply scientific and sustainable practices to forest resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.6.E: Use tools and methods to measure tree growth and forest land cover.			**AFNR.ENR.6.E.a.3:** Estimate tree volume and land cover of a forest using timber cruising methods and data.
AFNR.ENR.6.F: Determine methods to prevent and control forest diseases and insect damage.	**AFNR.ENR.6.F.b.1:** Identify common forest pests and diseases.	**AFNR.ENR.6.F.i.1:** Determine cause, prevention, symptoms, and treatment of forest diseases and insects.	**AFNR.ENR.6.F.a.1:** Create a management plan to prevent and control common diseases and pests.
	AFNR.ENR.6.F.b.2: List and identify woodland invasive species.	**AFNR.ENR.6.F.i.2:** Interpret how the invasive species spreads into the forest.	**AFNR.ENR.6.F.a.2:** Predict the spread of a woodland invasive species.
AFNR.ENR.6.G: Describe methods to prevent and control forest fires and wildfires as well as utilize fire as a management technique.	**AFNR.ENR.6.G.b.1.a:** Identify the advantages and disadvantages of having forest fires. **AFNR.ENR.6.G.b.1.b:** Describe the types of forest and wildfires. **AFNR.ENR.6.G.b.1.c:** List the requirements of fire. **AFNR.ENR.6.G.b.1.d:** Research the use of fire as a forest management technique.	**AFNR.ENR.6.G.i.1.a:** Determine the cause and prevention of forest fires. **AFNR.ENR.6.G.i.1.b:** Identify tools, equipment, and methods of fighting forest and wildfires. **AFNR.ENR.6.G.i.1.c:** List the effects of fuel types and terrain on forest and wildfire behavior. **AFNRE.ENR.6.G.i.1.d:** Identify situations when fire should be utilized as a forest management technique and the conditions required to make it effective.	**AFNR.ENR.6.G.a.1:** Generate a plan to help prevent future forest fires and wildfires. **AFNR.ENR.6.G.a.2:** Generate a forest management plan utilizing fire that includes measures to ensure the fire can be controlled.

Standard: AFNR.ENR.7

Students will apply scientific and sustainable practices to fish and wildlife management and production.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.7.A: Identify mammals, birds, fish, reptiles, and other species common to Wisconsin.	**AFNR.ENR.7.A.b.1:** Identify a Wisconsin food chain.	**AFNR.ENR.7.A.i.1:** Understand the interrelationship between most Wisconsin wildlife.	**AFNR.ENR.7.A.a.1:** Create a Wisconsin food web using only Wisconsin wildlife.
AFNR.ENR.7.B: Use scientific principles to estimate and manage wildlife populations.	**AFNR.ENR.7.B.b.1:** Identify methods to determine the population of a wildlife species.	**AFNR.ENR.7.B.i.1:** Determine common factors for increases and decreases in wildlife population.	**AFNR.ENR.7.B.a.1:** Calculate the population of a species of a given area over a number of years.
AFNR.ENR.7.C: Manage land to improve wildlife habitat.	**AFNR.ENR.7.C.b.1:** Describe quality wildlife habitat.	**AFNR.ENR.7.C.i.1:** Analyze high quality and low quality habitats.	**AFNR.ENR.7.C.a.1:** Assess a low quality habitat and create a management plan to increase the quality of the habitat.
	AFNR.ENR.7.C.b.2: List barriers to achieving quality wildlife habitat.	**AFNR.ENR.7.C.i.2:** Investigate management practices to improve habitat quality.	**AFNR.ENR.7.C.a.2:** Create a management plan to maintain and improve the quality of a habitat.
AFNR.ENR.7.D: Grow game fish in an aquaculture system.	**AFNR.ENR.7.D.b.1:** Understand fish anatomy and physiology.	**AFNR.ENR.7.D.i.1:** Understand the nutrition needs of fish in an aquaculture system.	**AFNR.ENR.7.D.a.1:** Manage a recirculating aquaculture system.
	AFNR.ENR.7.D.b.2: Understand fish growth patterns.	**AFNR.ENR.7.D.i.2:** Measure fish from nose to fin to track growth rates.	**AFNR.ENR.7.D.a.2:** Analyze the growth pattern of the fish, and make adjustments to the feed.

Standard: AFNR.ENR.7

Students will apply scientific and sustainable practices to fish and wildlife management and production.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.ENR.7.D: Grow game fish in an aquaculture system.	**AFNR.ENR.7.D.b.3:** Define "water quality."	**AFNR.ENR.7.D.i.3:** Understand the proper water quality for optimal growth: pH, nitrite, nitrate, ammonia, alkaline, phosphate, etc.	**AFNR.ENR.7.D.a.3:** Manage the water quality of the aquaculture system.

Standard: AFNR.ENR.8

Students will apply knowledge of the environment and natural resources to sustainable harvest and processing of natural resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.ENR.8.A: Determine tenets of sound agricultural stewardship to produce agronomic crops and livestock.	**AFNR.ENR.8.A.b.1:** Identify the impact crops and livestock have on the environment and natural resources.	**AFNR.ENR.8.A.i.1:** Evaluate management practices used to minimize the impact of agricultural stewardship on the environment and natural resources.	**AFNR.ENR.8.A.a.1:** Create a crop or livestock management plan to minimize the impact of the agronomic practices and increases the sustainability of the environment and natural resources.

Standard: AFNR.ENR.8

Students will apply knowledge of the environment and natural resources to sustainable harvest and processing of natural resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.8.B: Examine methods of timber harvesting.	**AFNR.ENR.8.B.b.1:** List methods of timber harvesting.	**AFNR.ENR.8.B.i.1:** Compare and contrast the different methods of timber harvest.	**AFNR.ENR.8.B.a.1:** Assess a forest and determine which harvest method should be used.
	AFNR.ENR.8.B.b.2: Describe tools used in timber harvesting.	**AFNR.ENR.8.B.i.2.a:** Compare and contrast the different timber harvesting tools. **AFNR.ENR.8.B.i.2.b:** Identify and demonstrate proper maintenance of timber harvesting tools. **AFNR.ENR.8.B.i.2.c:** List and describe safety precautions and PPE needed to safely harvest timber.	**AFNR.ENR.8.B.a.2:** Use tools to harvest timber.
AFNR.ENR.8.C: Explore types of mining common to Wisconsin, and determine environmental and cultural implications.	**AFNR.ENR.8.C.b.1:** Recognize a mineral and an ore.	**AFNR.ENR.8.C.i.1:** Describe the value of minerals and ores to the economy.	**AFNR.ENR.8.C.a.1:** Summarize economically important minerals and ores that are extracted and processed.
AFNR.ENR.8.D: Examine uses of fossil fuels, methods of extraction, and environmental impact.	**AFNR.ENR.8.D.b.1:** Define fossil fuels, and identify their sources.	**AFNR.ENR.8.D.i.1:** Describe sources of fossil fuels and products made from fossil fuels.	**AFNR.ENR.8.D.a.1:** Evaluate the impact of fossil fuels on the environment.

Standard: AFNR.ENR.8

Students will apply knowledge of the environment and natural resources to sustainable harvest and processing of natural resources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.8.E: Explore the harvest of native plants and substances.	**AFNR.ENR.8.E.b.1:** Identify native plants and substances within a given area.	**AFNR.ENR.8.E.i.1:** Research the harvest techniques of native plants and substances.	**AFNR.ENR.8.E.a.1:** Compare and contrast harvest techniques of native plants and substances.

Standard: AFNR.ENR.9

Students will manage and safely engage in outdoor resources for recreational purposes.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.9.A: Manage natural resources for recreational uses.	**AFNR.ENR.9.A.b.1:** Identify uses of natural resources for recreational purposes.	**AFNR.ENR.9.A.i.1:** Compare and contrast the different uses of natural resources.	**AFNR.ENR.9.A.a.1:** Design a recreational area using natural resources for public use.
AFNR.ENR.9.B: Use safety principles and attain certification for participation in outdoor activities.	**AFNR.ENR.9.B.b.1:** Describe the safety needs for outdoor activities.	**AFNR.ENR.9.B.i.1:** Assess the risks for outdoor activities.	**AFNR.ENR.9.B.a.1.a:** Create a liability waiver to protect stakeholders.

Standard: AFNR.ENR.9

Students will manage and safely engage in outdoor resources for recreational purposes.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.9.B: Use safety principles and attain certification for participation in outdoor activities.			**AFNR.ENR.9.B.a.1.b:** Attain outdoor recreation safety certifications. **AFNR.ENR9.B.a.1.c:** Prepare and present outdoor safety programs for groups and individuals.
AFNR.ENR.9.C: Use knowledge of first aid and outdoor survival skills to navigate emergencies.	**AFNR.ENR.9.C.b.1:** Identify low, medium, and high emergency first aid.	**AFNR.ENR.9.C.i.1:** Apply first aid procedures to scenarios.	**AFNR.ENR.9.C.a.1:** Apply basic survival skills and tools to survive an emergency scenario.

Standard: AFNR.ENR.10

Students will gain agricultural skills through an Environmental or Natural Resources Supervised Agricultural Experience (SAE) Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.ENR.10.A: Evaluate and implement steps and requirements to pursue a career opportunity in an AFNR career pathway.	**AFNR.ENR.10.A.b.1:** Identify and summarize steps to pursue a career in an AFNR pathway.	**AFNR.ENR.10.A.i.1:** Create a personal plan outlining goals and steps to obtain a career in an AFNR pathway.	**AFNR.ENR.10.A.a.1:** Evaluate progress toward AFNR career goals, and identify opportunities for improvement and necessary adjustments to an individual career plan.
	AFNR.ENR.10.A.b.2: Examine educational, training, and experiential requirements to pursue a career in an AFNR pathway.	**AFNR.ENR.10.A.i.2:** Analyze a personal skill set and add to career plan options for attaining required education, training, and experiences to obtain a career in an AFNR pathway.	**AFNR.ENR.10.A.a.2:** Evaluate, update, and improve a set of personal tools to reflect current skills, experiences, education, and goals, and complete processes needed to pursue and obtain a career in an AFNR pathway.
AFNR.ENR.10.B: Examine and choose career opportunities matched to personal skills, talents, and career goals in an AFNR pathway of interest.	**AFNR.ENR.10.B.b.1:** Research and describe careers in each of the AFNR pathways, and choose potential careers connecting to personal interests and skills.	**AFNR.ENR.10.B.i.1:** Assemble and analyze examples of careers and related statistics on local, state, national, and global levels.	**AFNR.ENR.10.B.a.1:** Conduct interviews with career professionals within the AFNR pathways, and summarize the results.
AFNR.ENR.10.C: Connect and apply academic learning, knowledge, and technical skills to solve problems through a Supervised Agriculture Experience (SAE).		**AFNR.ENR.10.C.i.1:** Identify opportunities to apply cross-curricular academic learning and technical skills to an SAE.	**AFNR.ENR.10.C.a.1:** Practice applying academic knowledge and technical skills in an SAE, and reflect on the results achieved.

Strand: Food Chemistry and Processing (FCP)

Standard: AFNR.FCP.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities of food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.1.A: Organize or create a model encompassing the components of food processing.	**AFNR.FCP.1.A.b.1:** Identify where food is produced and why it is processed.	**AFNR.FCP.1.A.i.1:** Illustrate how a food product is processed from farm to table.	**AFNR.FCP.1.A.a.1.a:** Research and locate food-processing facilities in your community. **AFNR.FCP.1.A.a.1.b:** Interview an employee of a food-processing facility.
AFNR.FCP.1.B: Research and communicate historical developments of food processing.	**AFNR.FCP.1.B.b.1:** Research and report important historical innovations and innovators in food processing or food science.	**AFNR.FCP.1.B.i.1:** Create a timeline showing how food processing has changed over the past century.	**AFNR.FCP.1.B.a.1:** Select and defend the most important innovator in food science or the food-processing industry.
AFNR.FCP.1.C: Summarize previous implications and predict future ones of food processing on a global scale.	**AFNR.FCP.1.C.b.1:** Identify and explain environmental and safety concerns about food processing in a different country.	**AFNR.FCP.1.C.i.1:** Identify safety issues and environmental concerns about foods and food processing: genetically modified organisms (GMO), microorganisms, contamination, and irradiation.	**AFNR.FCP.1.C.a.1:** Communicate an appropriate response to consumer concerns to assure a safe and wholesome food supply.

Standard: AFNR.FCP.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities of food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.1.C: Summarize previous implications and predict future ones of food processing on a global scale.	**AFNR.FCP.1.C.b.2:** Compare and contrast cultural differences regarding food products and processing practices.	**AFNR.FCP.1.C.i.2:** Analyze food production and distribution outcomes based on cultural customs.	**AFNR.FCP.1.C.a.2:** Propose and implement culturally sensitive food-processing and distribution practices.
AFNR.FCP.1.D: Evaluate the significance and implications of changes and trends in food processing.	**AFNR.FCP.1.D.b.1:** List current trends in food products for consumers: health and nutrition, organic, local food movements, farm-to-form supply chains, and food-system transparency.	**AFNR.FCP.1.D.i.1:** Correlate food trends to positive and negative outcomes.	**AFNR.FCP.1.D.a.1:** Hypothesize how trends in food processing impact human health and other factors.
	AFNR.FCP.1.D.b.2: Research and summarize examples of policy and legislation affecting food products and processing systems in the United States and around the world: labeling, GMOs, biosecurity, food-system policy, and dietary guidelines.	**AFNR.FCP.1.D.i.2:** Analyze the similarities and differences amongst policies and legislation that affect the food products and processing systems in the United States or around the world.	**AFNR.FCP.1.D.a.2:** Articulate and defend a personal point of view on policies and legislation affecting the food products and processing system in the United States or around the world.
AFNR.FCP.1.E: Examine career opportunities in food products and processing.	**AFNR.FCP.1.E.b.1:** Identify careers related to the food science and processing industry.	**AFNR.FCP.1.E.i.1:** Examine careers related to the food science and processing industry.	**AFNR.FCP.1.E.a.1:** Create a career plan for a career in the food science and processing industry.

Standard: AFNR.FCP.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities of food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.FCP.1.F: Communicate and work effectively in food chemistry and processing settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.FCP.1.F.b.1:** Identify barriers to effective communication in food chemistry and processing settings based on diverse backgrounds and abilities.	**AFNR.FCP.1.F.i.1:** Develop plans to communicate and work effectively in food chemistry and processing settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.FCP.1.F.a.1:** Implement plans to communicate and work effectively in food chemistry and processing settings with individuals and groups representing diverse backgrounds and abilities.

Standard: AFNR.FCP.2

Students will develop and apply safety principles applicable to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.FCP.2.A: Manage operational procedures, and create equipment and facility maintenance plans.	**AFNR.FCP.2.A.b.1:** Discuss the importance of hygiene expectations: hair nets, gloves, handwashing, equipment sanitation, etc.	**AFNR.FCP.2.A.i.1:** Explain the importance of developing and maintaining sanitation standard operating procedures (SSOPs).	**AFNR.FCP.2.A.a.1:** Develop and evaluate SSOP for a food-product processing plan.
	AFNR.FCP.2.A.b.2: Recognize appropriate good manufacturing practices (GMP).	**AFNR.FCP.2.A.i.2:** Explain and evaluate the purpose of GMP.	**AFNR.FCP.2.A.a.2:** Develop a plan to implement GMP for a food-product processing plan.

Standard: AFNR.FCP.2

Students will develop and apply safety principles applicable to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.2.B: Create and implement food safety plans for food processing.	**AFNR.FCP.2.B.b.1:** Describe foodborne illnesses and dangers associated with them.	**AFNR.FCP.2.B.i.1.a:** Identify and explain the seven principles of Hazard Analysis Critical Control Point (HACCP). **AFNR.FCP.2.B.i.1.b:** Establish procedures to eliminate possible contamination hazards associated with a food-product processing plan.	**AFNR.FCP.2.B.a.1:** Design and/or evaluate a food safety plan for a given food product.
	AFNR.FCP.2.B.b.2: Identify biological, chemical, and physical hazards while processing foods.	**AFNR.FCP.2.B.i.2.a:** Establish procedures to eliminate possible contamination hazards associated with food-product processing plan. **AFNR.FCP.2.B.i.2.b:** Identify critical control points associated with a food-product processing plan.	**AFNR.FCP.2.B.a.2:** Compose standard operating procedures (SOPs) or sanitation standard operating procedures (SSOPs) for a given food product.
AFNR.FCP.2.C: Apply safety and sanitation procedures for purchasing, handling, processing, and storing of food.	**AFNR.FCP.2.C.b.1:** Describe the effects foodborne pathogens have on food products and humans.	**AFNR.FCP.2.C.i.1:** Explain the importance of microbiological tests in food-product preparation, listing common spoilage and pathogenic microorganisms.	**AFNR.FCP.2.C.a.1:** Demonstrate approved food-product handling techniques.

Standard: AFNR.FCP.2

Students will develop and apply safety principles applicable to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.2.C: Apply safety and sanitation procedures for purchasing, handling, processing, and storing of food.	**AFNR.FCP.2.C.b.2:** Determine optimum refrigerator and freezer temperatures.	**AFNR.FCP.2.C.i.2:** Differentiate between expiration dates and "best by" dates on food products.	**AFNR.FCP.2.C.a.2:** Interpret quality assurance test results, and apply corrective procedures.
	AFNR.FCP.2.C.b.3: Explain the importance of recordkeeping in a food-product and processing system.	**AFNR.FCP.2.C.i.3:** Perform quality assurance tests on food products.	**AFNR.FCP.2.C.a.3:** Conduct and interpret microbiological tests for foodborne pathogens, and prescribe or implement corrective procedures.
	AFNR.FCP.2.C.b.4: Differentiate between expiration date and "best by" date posted on food packaging.	**AFNR.FCP.2.C.i.4:** Discuss documentation procedures in a food-products and processing system.	**AFNR.FCP.2.C.a.4:** Demonstrate proper recordkeeping in a food-product and processing system.
	AFNR.FCP.2.C.b.5: Identify and summarize purposes of food storage procedures: first in-first out, temperature regulation, and monitoring.	**AFNR.FCP.2.C.i.5:** Analyze characteristics of food products, and determine appropriate storage procedures.	**AFNR.FCP.2.C.a.5:** Prepare plans ensuring implementation of proper food-storage procedures.
AFNR.FCP.2.D: Demonstrate worker-safety procedures with food-product and processing equipment and facilities.	**AFNR.FCP.2.D.b.1:** Explain safety standards in the food industry.	**AFNR.FCP.2.D.i.1.a:** Outline guidelines for personnel safety in the food-products and processing industry.	**AFNR.FCP.2.D.a.1.a:** Create a checklist of industry-used safety procedures.

Standard: AFNR.FCP.2

Students will develop and apply safety principles applicable to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.2.D: Demonstrate worker-safety procedures with food-product and processing equipment and facilities.		**AFNR.FCP.2.D.i.1.b:** Create safety procedures for working in the school lab.	**AFNR.FCP.2.D.a.1.b:** Evaluate school lab safety procedures.
	AFNR.FCP.2.D.b.2: Classify different types of personal protective equipment, and demonstrate how to properly utilize the equipment.	**AFNR.FCP.2.D.i.2.a:** Create safety procedures for working in the school lab. **AFNR.FCP.2.D.i.2.b:** Assess need for personal protective equipment in a variety of situations, and select the appropriate equipment when working with different food products.	**AFNR.FCP.2.D.a.2.a:** Evaluate school lab safety procedures. **AFNR.FCP.2.D.a.2.b:** Verify cleaning procedures using allergen-monitoring tests.
AFNR.FCP.2.E: Work effectively with industry organizations, groups, and regulatory agencies affecting the food-processing industry.	**AFNR.FCP.2.E.b.1:** Explain how food production is monitored and inspected.	**AFNR.FCP.2.E.i.1:** Demonstrate how to interact effectively with organizations, groups, and regulatory agencies affecting food products and processing.	**AFNR.FCP.2.E.a.1:** Examine and evaluate changes in the food-products and processing industry brought about by industry organizations or regulatory agencies: USDA and FDA.
AFNR.FCP.2.E: Work effectively with industry organizations, groups, and regulatory agencies affecting the food-processing industry.	**AFNR.FCP.2.E.b.2:** Explain the importance and usage of guidelines in food products and processing.	**AFNR.FCP.2.E.i.2:** Research regulatory agencies and the laws they regulate.	**AFNR.FCP.2.E.a.2:** Determine which agency is responsible for regulating specific food products.

Standard: AFNR.FCP.3

Students will apply principles of science to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.3.A: Examine nature (reactivity and function) of the particles of food.	**AFNR.FCP.3.A.b.1:** Cite the composition and chemical formula of water.	**AFNR.FCP.3.A.i.1:** Explain how water content of food affects how it reacts during preparation and storage.	**AFNR.FCP.3.A.a.1.a:** Demonstrate the function of water in food preparation, i.e., heat transfer. **AFNR.FCP.3.A.a.1.b:** Model how water binds to food starches.
	AFNR.FCP.3.A.b.2: Name types of sugar used as food ingredients.	**AFNR.FCP.3.A.i.2.a:** Determine sweetness level of mono- and disaccharides. **AFNR.FCP.3.A.i.2.b:** Make connections between functions of sugar and food examples: caramelization, crystallization, etc.	**AFNR.FCP.3.A.a.2:** Demonstrate sugar crystal interfering agents.
	AFNR.FCP.3.A.b.3: Describe characteristics of the four categories—starch, cellulose, gums, pectins—of complex carbohydrates.	**AFNR.FCP.3.A.i.3:** Identify functions of complex carbohydrates in food preparation: gelatinization, thickening, etc.	**AFNR.FCP.3.A.a.3:** Utilize complex carbohydrates in food preparation.
	AFNR.FCP.3.A.b.4: Describe the molecular structure of different lipids.	**AFNR.FCP.3.A.i.4:** Examine functions of lipid in food preparation: tenderizing, aeration, heat transfer, emulsions, and flavoring.	**AFNR.FCP.3.A.a.4.a:** Utilize lipids in food preparation.

Standard: AFNR.FCP.3

Students will apply principles of science to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.3.A: Examine nature (reactivity and function) of the particles of food.	**AFNR.FCP.3.A.b.5:** Identify sources of protein and their relative protein content.	**AFNR.FCP.3.A.i.5:** Summarize functions of protein in food.	**AFNR.FCP.3.A.a.5.a:** Demonstrate permanent and nonpermanent protein denaturation **AFNR.FCP.3.A.a.5.b:** Compare protein elasticity in different flours (gluten). **AFNR.FCP.3.A.a.5.c:** Emulsify a food using egg protein.
	AFNR.FCP.3.A.b.6.a: Identify the purpose of enzymes in enzymatic reactions. **AFNR.FCP.3.A.b.6.b:** List factors affecting enzymatic activity.	**AFNR.FCP.3.A.i.6:** Examine foods that are developed as a result of enzymatic activity.	**AFNR.FCP.3.A.a.6.a:** Produce a food as a result of enzymatic reaction. **AFNR.FCP.3.A.a.6.b:** Formulate a method to prevent enzymatic browning in food.
	AFNR.FCP.3.A.b.7: Describe the chemical nature of vitamins and minerals and their function in the body.	**AFNR.FCP.3.A.i.7:** Distinguish between fat-soluble and water-soluble vitamins.	**AFNR.FCP.3.A.a.7:** Explain how chemical and physical properties of foods influence nutritional value and eating quality.

Standard: AFNR.FCP.3

Students will apply principles of science to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.3.B: Summarize the physical and chemical properties of food.	**AFNR.FCP.3.B.b.1:** Identify monosaccharides that are combined to form disaccharides.	**AFNR.FCP.3.B.i.1:** Distinguish molecules of monosaccharides and disaccharides.	**AFNR.FCP.3.B.a.1:** Demonstrate hydrolysis in the classroom lab.
	AFNR.FCP.3.B.b.2: List physical properties of starch and liquid mixture affecting selection of starches used in food products.	**AFNR.FCP.3.B.i.2:** Explain the process of hydrolysis.	**AFNR.FCP.3.B.a.2:** Determine which starch source can be substituted for another in food preparation.
	AFNR.FCP.3.B.b.3.a: List categories of lipids based on physical state. **AFNR.FCP.3.B.b.3.b:** Explain differences between melting point, smoke point, and flash point of lipids.	**AFNR.FCP.3.B.i.3:** Relate physical characteristics of lipids to their performance in food.	**AFNR.FCP.3.B.a.3.a:** Model differences between saturated and unsaturated fats. **AFNR.FCP.3.B.a.3.b:** Identify ways to reduce fat consumption through food preparation modifications.
	AFNR.FCP.3.B.b.4: Identify amino acid classification based on the chemical properties of the side chains.	**AFNR.FCP.3.B.i.4:** Determine different factors affecting protein denaturation and coagulation.	**AFNR.FCP.3.B.a.4:** Relate structure of protein to specific types of food preparation.

Standard: AFNR.FCP.3

Students will apply principles of science to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.3.C: Evaluate uses of food additives and substitutes.	**AFNR.FCP.3.C.b.1.a:** Identify common food additives and substitutes. **AFNR.FCP.3.C.b.1.b:** Explain the functions of food additives and substitutes.	**AFNR.FCP.3.C.i.1:** Identify food additives and substitutes given an ingredient label.	**AFNR.FCP.3.C.a.1:** Formulate or process a product utilizing a food additive or substitute to meet a given purpose.
AFNR.FCP.3.D: Correlate food labels to the human diet.	**AFNR.FCP.3.D.b.1:** Describe human body requirements for water and its nutritional value.		
	AFNR.FCP.3.D.b.2: Identify dietary sources of carbohydrates.	**AFNR.FCP.3.D.i.2.a:** Explain the use of carbohydrates in the human body. **AFNR.FCP.3.D.i.2.b:** Recognize diseases related to carbohydrate usages such as diabetes, hypoglycemia, and tooth decay.	**AFNR.FCP.3.D.a.2:** Explain the sources and role of fiber in the diet.
	AFNR.FCP.3.D.b.3: Identify dietary sources of lipids.	**AFNR.FCP.3.D.i.3.a:** Explain the use of lipids in the human body. **AFNR.FCP.3.D.i.3.b:** Examine diseases related to lipid consumption: hypertension, atherosclerosis, obesity, heart disease, etc.	**AFNR.FCP.3.D.a.3.a:** Explain advances in research regarding lipid metabolism: omega, cis fats, trans fats, etc. **AFNR.FCP.3.D.a.3.b:** Explain the relationship between cholesterol and lipids.

Standard: AFNR.FCP.3

Students will apply principles of science to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.3.D: Correlate food labels to the human diet.	**AFNR.FCP.3.D.b.4.a:** Distinguish between essential and nonessential amino acids and their roles in the body. **AFNR.FCP.3.D.b.4.b:** Describe uses of proteins in the human body.	**AFNR.FCP.3.D.i.4:** Recognize conditions associated with protein deficiency.	**AFNR.FCP.3.D.a.4:** Differentiate between complete, incomplete, and high quality protein, and their relationship to vegetarian diets.
	AFNR.FCP.3.D.b.5: Explain the functions of vitamins in the human body.	**AFNR.FCP.3.D.i.5:** Identify conditions associated with deficiency and toxicity of vitamins.	**AFNR.FCP.3.D.a.5:** Recognize the concept of bioavailability of vitamins and factors that affect the bioavailability of vitamins.
	AFNR.FCP.3.D.b.6: Distinguish between micro and macro minerals and functions in the body.	**AFNR.FCP.3.D.i.6:** Identify conditions associated with mineral deficiency and toxicity.	**AFNR.FCP.3.D.a.6:** Recognize the importance of phytochemicals in reducing health risks for conditions: cancer, high cholesterol, etc.
	AFNR.FCP.3.D.b.7: Locate required claims, required information, and consumer warnings on food labels.	**AFNR.FCP.3.D.i.7:** Use indicators to determine the presence of food nutrients.	**AFNR.FCP.3.D.a.7:** Use the scientific method to investigate the presence of nutrients in unknown food sources.
	AFNR.FCP.3.D.b.8: Examine and explain the importance of food labeling to the consumer.	**AFNR.FCP.3.D.i.8:** Identify the nutrient content of each ingredient for a food product, and prepare a nutrition panel.	**AFNR.FCP.3.D.a.8:** Prepare a food label according to established standards of regulatory agencies.

Standard: AFNR.FCP.3

Students will apply principles of science to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.3.D: Correlate food labels to the human diet.	**AFNR.FCP.3.D.b.9:** Designate a daily food guide for a healthful diet (MyPlate).	**AFNR.FCP.3.D.i.9:** Calculate caloric content of foods based on nutrition content.	**AFNR.FCP.3.D.a.9:** Recommend alternative foods for individuals with dietary restrictions.
AFNR.FCP.3.E: Examine the positive role microorganisms play in food products and processing.	**AFNR.FCP.3.E.b.1.a:** Recognize general groups in which microorganisms are classified. **AFNR.FCP.3.E.b.1.b:** Define and identify different kinds of fermentation processes.	**AFNR.FCP.3.E.i.1.a:** Discuss factors impacting growth of microorganisms. **AFNR.FCP.3.E.i.1.b:** Demonstrate processes involved in the production of fermented products: yeast bread, vinegar, yogurt, cheese, soda, etc.	**AFNR.FCP.3.E.a.1:** Design an experiment utilizing microorganisms to produce a food.
	AFNR.FCP.3.E.b.2: Observe the deterioration rate of food products at room temperature, refrigeration, and freezing.	**AFNR.FCP.3.E.i.2:** Compare microbial growth of nonheat-treated and heat-treated buttermilk.	**AFNR.FCP.3.E.a.2:** Study the effects of water on microbes by removing water from a food (fruit).
	AFNR.FCP.3.E.b.3: Study the effects of water on microbes by removing water from a food (fruit).		

Standard: AFNR.FCP.3

Students will apply principles of science to food chemistry, products, and processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.3.F: Perform sensory science research to determine consumer wants and needs.	**AFNR.FCP.3.F.b.1:** Participate in sensory evaluation modeling factors to identify biases.	**AFNR.FCP.3.F.i.1:** Discuss how irrelevant factors can manipulate the perception of panelists.	**AFNR.FCP.3.F.a.1:** Construct and conduct a sensory-evaluation experiment, and analyze the outcome.
	AFNR.FCP.3.F.b.2: Describe the roles of the senses in analyzing a food product.	**AFNR.FCP.3.F.i.2:** Describe different sensory evaluation tests used to analyze food products and factors to control setting up tests.	**AFNR.FCP.3.F.a.2:** Perform sensory-testing and marketing functions to characterize and determine consumer preference and market potential.
	AFNR.FCP.3.F.b.3: Describe factors in planning and developing a new food product: regulation, creativity, economics, etc.	**AFNR.FCP.3.F.i.3:** Plan and create a new food product.	

Standard: AFNR.FCP.4

Students will select quality food products for processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.4.A: Use harvesting, selection, and inspection techniques to obtain quality food products for processing.	**AFNR.FCP.4.A.b.1:** Identify techniques used to sort and classify food products: size, color, maturity, etc.	**AFNR.FCP.4.A.i.1:** Discuss factors affecting quality and yield grades of food products.	**AFNR.FCP.4.A.a.1:** Assign quality and yield grades to food products according to industry standards.
	AFNR.FCP.4.A.b.2: Compare and contrast fresh, frozen, canned, or other forms of processed food products.	**AFNR.FCP.4.A.i.2:** Select raw food products by performing quality-control inspections of raw food products for processing.	**AFNR.FCP.4.A.a.2:** Develop and demonstrate procedures to maintain original food quality and yield.
	AFNR.FCP.4.A.b.3.a: Identify proper care of production animals, and describe accepted animal treatment and harvesting techniques. **AFNR.FCP.4.A.b.3.b:** Describe the importance of meat inspection.	**AFNR.FCP.4.A.i.3.a:** Compare and contrast industry-approved production animal care and treatment. **AFNR.FCP.4.A.i.3.b:** Explain characteristics of animals in relation to food production.	**AFNR.FCP.4.A.a.3:** Research and present regulatory-agency-approved or industry-approved techniques for harvesting animals.
AFNR.FCP.4.B: Evaluate, grade, and classify food products.	**AFNR.FCP.4.B.b.1:** Identify and describe foods derived from meat.	**AFNR.FCP.4.B.i.1:** Discuss desirable qualities of processed meat products.	**AFNR.FCP.4.B.a.1:** Evaluate, grade, and classify (wholesale, retail cuts) processed meat products.
	AFNR.FCP.4.B.b.2: Identify and describe foods derived from eggs and poultry.	**AFNR.FCP.4.B.i.2:** Discuss desirable qualities of processed egg and poultry products.	**AFNR.FCP.4.B.a.2:** Evaluate, grade, and classify processed egg and poultry products.

Standard: AFNR.FCP.4

Students will select quality food products for processing.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.4.B: Evaluate, grade, and classify food products.	**AFNR.FCP.4.B.b.3:** Identify and describe foods derived from fish and seafood.	**AFNR.FCP.4.B.i.3:** Discuss desirable qualities of processed fish and seafood products.	**AFNR.FCP.4.B.a.3:** Evaluate, grade, and classify processed fish and seafood products.
	AFNR.FCP.4.B.b.4: Identify and describe foods derived from dairy products.	**AFNR.FCP.4.B.i.4:** Discuss desirable qualities of processed dairy products.	**AFNR.FCP.4.B.a.4:** Evaluate, grade, and classify processed dairy products.
	AFNR.FCP.4.B.b.5: Identify and describe products derived from fruits or nuts.	**AFNR.FCP.4.B.i.5:** Discuss desirable qualities of processed fruit or nut products.	**AFNR.FCP.4.B.a.5:** Evaluate, grade, and classify processed fruit or nut products.
	AFNR.FCP.4.B.b.6: Identify and describe foods derived from vegetables.	**AFNR.FCP.4.B.i.6:** Discuss desirable qualities of processed vegetable products.	**AFNR.FCP.4.B.a.6:** Evaluate, grade, and classify processed vegetable products.
	AFNR.FCP.4.B.b.7: Identify and describe products derived from grains, legumes, or oilseeds.	**AFNR.FCP.4.B.i.7:** Discuss desirable qualities of processed grains, legumes, or oilseed products.	**AFNR.FCP.4.B.a.7:** Evaluate, grade and classify processed grains, legumes, or oilseed products.
	AFNR.FCP.4.B.b.8: Summarize characteristics of quality and yield grade of food products.	**AFNR.FCP.4.B.i.8:** Analyze factors that affect quality and yield grade of food products.	**AFNR.FCP.4.B.a.8:** Outline procedures to assign quality and yield grades to food products according to industry standards.

Standard: AFNR.FCP.5

Students will prepare and process food products for consumption, storage, and distribution.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.5.A: Process, preserve, package, and present food products for sale and distribution.	**AFNR.FCP.5.A.b.1:** Explain methods and materials for processing foods for sale as fresh-food products.	**AFNR.FCP.5.A.i.1:** Demonstrate how fresh foods are prepared for distribution.	**AFNR.FCP.5.A.a.1:** Evaluate foods prepared for the fresh-food market based on factors such as shelf life, shrinkage, appearance, and weight.
	AFNR.FCP.5.A.b.2: Identify methods of food preservation, and give examples of foods preserved by each method.	**AFNR.FCP.5.A.i.2:** Explain processes of food preservation methods.	**AFNR.FCP.5.A.a.2:** Preserve foods using various methods and techniques.
	AFNR.FCP.5.A.b.3: Explain materials and methods of food packaging and presentation.	**AFNR.FCP.5.A.i.3:** Design a food package to protect food and attract consumers.	**AFNR.FCP.5.A.a.3:** Evaluate a food package with given parameters.
	AFNR.FCP.5.A.b.4: Identify and explain methods used to store food.	**AFNR.FCP.5.A.i.4:** Determine appropriate methods and conditions for storing raw and processed food products based on their characteristics.	**AFNR.FCP.5.A.a.4:** Compare and contrast foods stored under varying conditions for quality, shelf life, and intended use.
	AFNR.FCP.5.A.b.5: Assess and describe environmental impact of distributing food locally and globally.	**AFNR.FCP.5.A.i.5:** Research and document ways to reduce environmental impact from food-distribution activities.	**AFNR.FCP.5.A.a.5:** Devise and defend a strategy to determine ways for food distribution to reduce environmental impacts.

Standard: AFNR.FCP.5

Students will prepare and process food products for consumption, storage, and distribution.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.5.A: Process, preserve, package, and present food products for sale and distribution.	**AFNR.FCP.5.A.b.6:** Examine various paths food products take from food-processing centers to consumers.	**AFNR.FCP.5.A.i.6:** Interpret safety procedures used in food distribution to ensure a safe product is being delivered to consumers.	**AFNR.FCP.5.A.a.6:** Make recommendations to improve safety procedures used in food-distribution scenarios to ensure a safe product is being delivered to consumers.
AFNR.FCP.5.B: Demonstrate professional food-preparation methods and techniques to produce a variety of foods to meet consumer demands.	**AFNR.FCP.5.B.b.1.a:** Identify knife safety and other safety tips around sharp objects used in food processing. **AFNR.FCP.5.B.b.1.b:** Explore basic kitchen measuring devices and tools.	**AFNR.FCP.5.B.i.1.a:** Demonstrate skills in handling knives, tools, and equipment safely. **AFNR.FCP.5.B.i.1.b:** Identify tools used in food preparation.	**AFNR.FCP.5.B.a.1:** Demonstrate professional skills in cooking foods using: roasting, broiling, smoking, grilling, sauteing, pan frying, deep frying, braising, stewing, poaching, steaming or baking using professional equipment.
	AFNR.FCP.5.B.b.2.a: Explore basic kitchen measuring devices and tools. **AFNR.FCP.5.B.b.2.b:** Demonstrate the use of a food thermometer.	**AFNR.FCP.5.B.i.2.a:** Identify tools used in food preparation. **AFNR.FCP.5.B.i.2.b:** Apply measurement skills in a class recipe.	**AFNR.FCP.5.B.a.2:** Apply the fundamentals of time, temperature, and cooking methods to cooking, cooling, reheating, and holding a variety of foods.
		AFNR.FCP.5.B.i.3: Prepare a class recipe using meat, seafood, or poultry by demonstrating safe handling techniques.	**AFNR.FCP.5.B.a.3:** Prepare various meats, seafood, or poultry using safe handling and professional preparation techniques.

Standard: AFNR.FCP.5

Students will prepare and process food products for consumption, storage, and distribution.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.5.B: Demonstrate professional food-preparation methods and techniques to produce a variety of foods to meet consumer demands.	**AFNR.FCP.5.B.b.4:** Prepare a basic recipe using fruits or vegetables.	**AFNR.FCP.5.B.i.4:** Prepare recipes with fruit, vegetables, or dairy products.	**AFNR.FCP.5.B.a.4:** Prepare various fruits, vegetables, starches, legumes, dairy products, fats or oils using safe handling and professional preparation techniques.
	AFNR.FCP.5.B.b.5: Identify ingredients commonly used when making baked goods or dessert	**AFNR.FCP.5.B.i.5:** Prepare baked goods or desserts.	**AFNR.FCP.5.B.a.5:** Prepare breads, baked goods or desserts using safe handling and professional preparation techniques.
	AFNR.FCP.5.B.b.6: List common examples of convenience foods.	**AFNR.FCP.5.B.i.6:** Compare and contrast convenience foods based on cost, time, and use of resources.	
	AFNR.FCP.5.B.b.7: Explain techniques for preparing ready-to-eat food products: snack food, convenience meals, or a microwaveable meal.	**AFNR.FCP.5.B.i.7:** Research the steps involved in the creation of ready-to-eat food products.	**AFNR.FCP.5.B.a.7:** Create and evaluate ready-to-eat food products.

Standard: AFNR.FCP.6

Students will gain agricultural skills through a Food Chemistry, Products, and Processing Supervised Agricultural Experience (SAE) Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.FCP.6.A: Evaluate and implement steps and requirements to pursue a career opportunity in an AFNR career pathway.	**AFNR.FCP.6.A.b.1:** Identify and summarize steps to pursue a career in an AFNR pathway.	**AFNR.FCP.6.A.i.1:** Create a personal plan outlining goals and steps to obtain a career in an AFNR pathway.	**AFNR.FCP.6.A.a.1:** Evaluate progress toward AFNR career goals, and identify opportunities for improvement and necessary adjustments to an individual career plan.
	AFNR.FCP.6.A.b.2: Examine educational, training, and experiential requirements to pursue a career in an AFNR pathway.	**AFNR.FCP.6.A.b.2:** Analyze a personal skill set, and add to career plan options for attaining required education, training, and experiences to obtain a career in an AFNR pathway.	**AFNR.FCP.6.A.a.2:** Evaluate, update, and improve a set of personal tools to reflect current skills, experiences, education, and goals, and complete processes needed to pursue and obtain a career in an AFNR pathway.
AFNR.FCP.6.B: Examine and choose career opportunities matched to personal skills, talents, and career goals in an AFNR pathway of interest.	**AFNR.FCP.6.B.b.1:** Research and describe careers in each of the AFNR pathways, and choose potential careers connecting to personal interests and skills.	**AFNR.FCP.6.B.i.1:** Assemble and analyze examples of careers and related statistics on local, state, national, and global levels.	**AFNR.FCP.6.B.a.1:** Conduct interviews with career professionals within the AFNR pathways, and summarize the results.
AFNR.FCP.6.C: Connect and apply academic learning, knowledge, and technical skills to solve problems through a Supervised Agriculture Experience (SAE).		**AFNR.FCP.6.C.i.1:** Identify opportunities to apply cross-curricular academic learning and technical skills to an SAE.	**AFNR.FCP.6.C.a.1:** Practice applying academic knowledge and technical skills in an SAE, and reflect on the results achieved.

Strand: Plant Science (PS)

Standard: AFNR.PS.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities of the plant industry.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.1.A: Describe sectors of the plant systems career pathway.	**AFNR.PS.1.A.b.1:** Determine sectors of agronomy, horticulture, floriculture, pomology, olericulture, aquaponics, hydroponics, aeroponics, landscaping, greenhouses, community supported agriculture (CSA), etc.	**AFNR.PS.1.A.i.1:** Classify plant specimens to various plant systems.	**AFNR.PS.1.A.a.1:** Compare and contrast sectors of plant science based on plant varieties and uses.
	AFNR.PS.1.A.b.2: Research the sectors of a plant systems career pathway and pros and cons of local, regional, continental, and global plant issues.	**AFNR.PS.1.A.i.2:** Interview a plant systems career pathway professional.	**AFNR.PS.1.A.a.2.a:** Communicate with a plant systems career pathway professional. **AFNR.PS.1.A.a.2.b:** Collaborate with local plant systems career pathway businesses. **AFNR.PS.1.A.a.2.c:** Survey a target population for a product or service in a plant systems career pathway.

Standard: AFNR.PS.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities of the plant industry.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.1.A: Describe sectors of the plant systems career pathway.		**AFNR.PS.1.A.i.3:** Inventory AFNR program supplies for a plant-systems school-based enterprise.	**AFNR.PS.1.A.a.3:** Propose a new plant-systems career pathway business for a local community.
AFNR.PS.1.B: Describe global distribution of plant specimens.	**AFNR.PS.1.B.b.1:** Report global diversity of plant systems career pathway.	**AFNR.PS.1.B.i.1:** Examine import and export protocols for plant materials and products.	**AFNR.PS.1.B.a.1:** Judge and appraise plant and plant products according to industry standards.
	AFNR.PS.1.B.b.2: Categorize plants based on production locations.	**AFNR.PS.1.B.i.2:** Classify plants by origin and compare economics of plant distribution and supply chain.	**AFNR.PS.1.B.a.2.a:** Perform a plant inspection. **AFNR.PS.1.B.a.2.b:** Justify importing and exporting a plant or plant products.
AFNR.PS.1.C: Describe how data influences plant systems.	**AFNR.PS.1.C.b.1:** Identify points in plant production where data could be collected.	**AFNR.PS.1.C.i.1:** Utilize historical data to make business decisions and predict trends in a plant-systems career pathway enterprise.	**AFNR.PS.1.C.a.1:** Forecast plant specimen procurement and sales.

Standard: AFNR.PS.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities of the plant industry.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.1.C: Describe how data influences plant systems.	**AFNR.PS.1.C.b.2.a:** Operate a data-collection instrument. **AFNR.PS.1.C.b.2.b:** Research industry norms data for various data-collection sets.	**AFNR.PS.1.C.i.2:** Interpret data collected from a plant-systems enterprise.	**AFNR.PS.1.C.a.2:** Convert data into a tangible format to make business decisions.
	AFNR.PS.1.C.b.3: Discuss how data can impact plant systems.	**AFNR.PS.1.C.i.3:** Compare and contrast data sets to make plant-specimen decisions.	**AFNR.PS.1.C.a.3:** Forecast plant- or plant-product needs based on data sets.
	AFNR.PS.1.C.b.4: Explain precision agriculture as it relates to plant systems.	**AFNR.PS.1.C.i.4:** Predict trends in plant data.	**AFNR.PS.1.C.a.4:** Hypothesize outcomes for plant- and plant-product needs.
AFNR.PS.1.D: Describe advancements in plant systems through genetic engineering.	**AFNR.PS.1.D.b.1:** Identify plants that are genetically engineered.	**AFNR.PS.1.D.i.1.a:** Interpret plant genomes. **AFNR.PS.1.D.i.1.b:** Analyze how plants are manipulated to create new cultivars and varieties.	**AFNR.PS.1.D.a.1:** Produce genetically engineered plants.

Standard: AFNR.PS.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities of the plant industry.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.1.D: Describe advancements in plant systems through genetic engineering.	**AFNR.PS.1.D.b.2:** Research traits associated with genetic engineering.	**AFNR.PS.1.D.i.2:** Compare and contrast genetically engineered crops to conventional crops.	**AFNR.PS.1.D.a.2.a:** Justify the usage of plants with genetically engineered traits. **AFNR.PS.1.D.a.2.b:** Negotiate the usage of genetically engineered plants.
	AFNR.PS.1.D.b.3: Select traits that emerging plants could utilize for the benefit of humans.	**AFNR.PS.1.D.i.3:** Solve world-problem scenarios with genetically engineered plants.	**AFNR.PS.1.D.a.3:** Choose plants based on genetically engineered or conventional traits.
AFNR.PS.1.E: Describe sustainability practices in plant systems.	**AFNR.PS.1.E.b.1:** Define sustainability as it relates to plant-system career pathways and agribusiness enterprises.	**AFNR.PS.1.E.i.1:** List sustainable practices currently available for a plant-production system.	**AFNR.PS.1.E.a.1:** Adapt sustainable practices to plant-production systems.
		AFNR.PS.1.E.i.2: Analyze sustainable practices for desired outcomes.	**AFNR.PS.1.E.a.2.a:** Initiate sustainable practices in a plant-production system. **AFNR.PS.1.E.a.2.b:** Integrate sustainable practices into a plant-production system.

Standard: AFNR.PS.1

Students will examine the components, applications, historical development, global implications, future trends, and career opportunities of the plant industry.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.1.E: Describe sustainability practices in plant systems.	**AFNR.PS.1.E.b.3:** Explain how humans can sustainably produce a plant in a plant-production system.	**AFNR.PS.1.E.i.3:** Examine sustainable initiatives.	**AFNR.PS.1.E.a.3.a:** Propose or revise a sustainable plan in a plant-production system. **AFNR.PS.1.E.a.3.b:** Defend sustainable initiatives.
AFNR.PS.1.F: Communicate and work effectively in plant science settings with individuals and groups representing diverse backgrounds and abilities**.**	**AFNR.PS.1.F.b.1:** Identify barriers to effective communication in plant science settings based on diverse backgrounds and abilities.	**AFNR.PS.1.F.i.1:** Develop plans to communicate and work effectively in plant science settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.PS.1.F.a.1:** Implement plans to communicate and work effectively in plant science settings with individuals and groups representing diverse backgrounds and abilities.

Standard: AFNR.PS.2

Students will apply knowledge of plant classification, anatomy, and physiology to the production and management of plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.2.A: Classify agricultural plants according to taxonomy systems.	**AFNR.PS.2.A.b.1:** Identify how people use plants.	**AFNR.PS.2.A.i.1:** Match plant products to the appropriate plant class.	**AFNR.PS.2.A.a.1:** Judge and grade plant species or parts based on industry-quality factors.
	AFNR.PS.2.A.b.2.a: Describe the morphological characteristics used to identify agricultural plants. **AFNR.PS.2.A.b.2.b:** Observe and describe changes in plants as seasons change.	**AFNR.PS.2.A.i.2:** Identify major groups of plants based on physiological characteristics.	**AFNR.PS.2.A.a.2:** Classify plants based on physiological characteristics.
	AFNR.PS.2.A.b.3: Group plants with similar characteristics.	**AFNR.PS.2.A.i.3:** Prepare a chart categorizing plants or plant products by similar characteristics.	**AFNR.PS.2.A.a.3:** Distinguish a plant species by using a dichotomous key.
		AFNR.PS.2.A.i.4: Explain systems used to classify plants, and compare and contrast the hierarchical agricultural plants.	**AFNR.PS.2.A.a.4:** Classify agricultural plants according to the hierarchical classification system, life cycles, plant use, and as monocots or dicots.

Standard: AFNR.PS.2

Students will apply knowledge of plant classification, anatomy, and physiology to the production and management of plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.2.A: Classify agricultural plants according to taxonomy systems.	**AFNR.PS.2.A.b.5:** Identify agriculturally important plants by common names.	**AFNR.PS.2.A.i.5:** Identify agriculturally important plants by scientific name.	**AFNR.PS.2.A.a.5.a:** Validate a plant species. **AFNR.PS.2.A.a.5.b:** Assess a location to validate a plant species. **AFNR.PS.2.A.a.5.c:** Create a presentation about an important agricultural plant.
		AFNR.PS.2.A.i.6: Collaborate with an industry professional to witness agriculturally important plants.	**AFNR.PS.2.A.a.6:** Articulate an authentic artifact based on important agricultural plants.
AFNR.PS.2.B: Apply knowledge of plant anatomy and functions of plant structures to activities associated with plant systems.	**AFNR.PS.2.B.b.1:** Draw the life cycle of a plant.	**AFNR.PS.2.B.i.1:** Describe ways seeds and fruit may be carried or transported through the environment.	**AFNR.PS.2.B.a.1:** Compare and contrast mitosis and meiosis, and apply knowledge of cell differentiation and function of major types of tissues to plant systems.
	AFNR.PS.2.B.b.2: Match products to plant structures.	**AFNR.PS.2.B.i.2.a:** Analyze plant structures using magnification or microscopes.	**AFNR.PS.2.B.a.2.a:** Describe and apply the processes of translocation to management of plants.

Standard: AFNR.PS.2

Students will apply knowledge of plant classification, anatomy, and physiology to the production and management of plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.2.B: Apply knowledge of plant anatomy and functions of plant structures to activities associated with plant systems.		**AFNR.PS.2.B.i.2.b:** Identify environmental products from plants.	**AFNR.PS.2.B.a.2.b:** Explore biomass production and plant uses.
	AFNR.PS.2.B.b.3: Match seeds to plants.	**AFNR.PS.2.B.i.3:** Explain functions and components of seeds and fruit.	**AFNR.PS.2.B.a.3:** Apply knowledge of seed and fruit structures to plant culture and use.
	AFNR.PS.2.B.b.4: Match root types to plants.	**AFNR.PS.2.B.i.4:** Identify the components, types, and functions of plant roots.	**AFNR.PS.2.B.a.4:** Identify root tissues, and explain the pathway of water and nutrients into and through the root tissues.
	AFNR.PS.2.B.b.5: Match leaves to plants.	**AFNR.PS.2.B.i.5:** Discuss leaf morphology and the functions of leaves.	**AFNR.PS.2.B.a.5:** Explain how leaves capture light energy and allow for the exchange of gasses.
	AFNR.PS.2.B.b.6: Match stem tissue to plants.	**AFNR.PS.2.B.i.6:** Identify the components and functions of plant stems.	**AFNR.PS.2.B.a.6:** Relate active and passive transport of minerals into and through the vascular system to plant nutrition.

Standard: AFNR.PS.2

Students will apply knowledge of plant classification, anatomy, and physiology to the production and management of plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.2.B: Apply knowledge of plant anatomy and functions of plant structures to activities associated with plant systems.	**AFNR.PS.2.B.b.7:** Match flowers to plants.	**AFNR.PS.2.B.i.7:** Identify the components of a flower and their functions.	**AFNR.PS.2.B.a.7:** Identify different types of flowers and flower forms, and apply knowledge of flower structures to plant breeding, production, and use.
	AFNR.PS.2.B.b.8: Identify the organelles within a plant cell and their functions.	**AFNR.PS.2.B.i.8:** Draw or build a plant cell with its organelles.	**AFNR.PS.2.B.a.8:** Diagram a typical plant cell, and identify plant-cell organelles and their functions.
AFNR.PS.2.C: Apply energy conversion to plant systems.	**AFNR.PS.2.C.b.1:** Identify inputs and outputs for reactions of photosynthesis and cellular respiration.	**AFNR.PS.2.C.i.1:** Explain basic process of photosynthesis and its importance to life on Earth.	**AFNR.PS.2.C.a.1:** Analyze environmental conditions outside and in a controlled environment and factors that affect photosynthesis and respiration rates.
		AFNR.PS.2.C.i.2: Explain light-dependent and light-independent reactions occurring during photosynthesis, and apply knowledge to plant management.	**AFNR.PS.2.C.a.2:** Explain the Calvin cycle and its importance to plant life.

Standard: AFNR.PS.2

Students will apply knowledge of plant classification, anatomy, and physiology to the production and management of plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.2.C: Apply energy conversion to plant systems.		**AFNR.PS.2.C.i.3:** Explain cellular respiration and its importance to plant life.	**AFNR.PS.2.C.a.3.a:** Explain the four stages of aerobic respiration, and relate cellular respiration to plant growth, crop management, and post-harvest handling. **AFNR.PS.2.C.a.3.b:** Explain factors affecting cellular respiration, and identify products and byproducts of cellular respiration.
	AFNR.PS.2.C.b.4: Identify light sources for plants in various agricultural production systems.	**AFNR.PS.2.C.i.4.a:** Identify types of plant shading products, structures, or natural environment scenarios. **AFNR.PS.2.C.i.4.b:** Research light sources using quantitative measurement tools and equipment.	**AFNR.PS.2.C.a.4:** Collaborate with industry partners to research plant products in production systems.
	AFNR.PS.2.C.b.5: Differentiate how sun or artificial light affects plant growth.	**AFNR.PS.2.C.i.5:** Investigate photosynthesis and respiration rates from a plant species.	**AFNR.PS.2.C.a.5:** Produce plants by changing environmental factors affecting energy conversion.

Standard: AFNR.PS.2

Students will apply knowledge of plant classification, anatomy, and physiology to the production and management of plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.2.C: Apply energy conversion to plant systems.	**AFNR.PS.2.C.b.6:** Research variables in a plant-production system.	**AFNR.PS.2.C.i.6:** Experiment with various artificial light sources and heights of those sources to affect plant growth.	**AFNR.PS.2.C.a.6:** Design and conduct an investigation utilizing variables in a plant production system.
AFNR.PS.2.D: Apply knowledge of plant physiology to plant systems.	**AFNR.PS.2.D.b.1:** Observe seed germination and plant growth, and changes in seed and plant characteristics.	**AFNR.PS.2.D.i.1:** Compare and contrast monocot and dicot seeds and plant growth characteristics.	**AFNR.PS.2.D.a.1:** Design and conduct an investigation comparing monocot and dicot responses to plant production systems and variables.
	AFNR.PS.2.D.b.2: Identify different types of plant-growth regulators.	**AFNR.PS.2.D.i.2:** Identify five groups of naturally occurring plant hormones and synthetic plant-growth regulators.	**AFNR.PS.2.D.a.2:** Select plant-growth regulators to produce desired responses from plants.
		AFNR.PS.2.D.i.3: Identify plant response to plant-growth regulators and different forms of tropism.	**AFNR.PS.2.D.a.3.a:** Research and experiment with tropism effects. **AFNR.PS.2.D.a.3.b:** Research and experiment plant responses to growth regulators.

Standard: AFNR.PS.2

Students will apply knowledge of plant classification, anatomy, and physiology to the production and management of plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.2.D: Apply knowledge of plant physiology to plant systems.	**AFNR.PS.2.D.b.4.a:** Define primary growth and the role of the apical meristem. **AFNR.PS.2.D.b.4.b:** Explain the process of secondary plant growth.	**AFNR.PS.2.D.i.4:** Relate principles of primary and secondary growth to plant systems.	**AFNR.PS.2.D.a.4:** Identify primary and secondary growth on a living specimen.
		AFNR.PS.2.D.i.5.a: Observe how a clone develops callus tissue. **AFNR.PS.2.D.i.5.b:** Observe a graft union callus.	**AFNR.PS.2.D.a.5:** Create a graft using plant tissue.

Standard: AFNR.PS.3

Students will evaluate plant growth requirements and develop a plant management plan.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.3.A: Determine influence of environmental factors on plant growth.	**AFNR.PS.3.A.b.1:** Define the elements plants need to grow successfully.	**AFNR.PS.3.A.i.1.a:** Describe the qualities of light that affect plant growth. **AFNR.PS.3.A.i.1.b:** Describe plant responses to light color, intensity, and duration. **AFNR.PS.3.A.i.1.c:** Describe the effects that air, temperature, and water have on plant metabolism and growth. **AFNR.PS.3.A.i.1.d:** Determine optimal air, temperature, and water conditions for plant growth.	**AFNR.PS.3.A.a.1:** Design, implement, and evaluate a plan to maintain optimal conditions for plant growth.
	AFNR.PS.3.A.b.2: Identify different ways land is used to grow plants.	**AFNR.PS.3.A.i.2:** Compare and contrast "Controlled Environmental Agriculture (CEA)" systems to outdoor production systems.	**AFNR.PS.3.A.a.2:** Revise a growing area for a plant based on environmental factors.
	AFNR.PS.3.A.b.3: Prepare and analyze data from a production system.	**AFNR.PS.3.A.i.3:** Recommend production plans for a plant species.	**AFNR.PS.3.A.a.3:** Produce a plant species in a system.

Standard: AFNR.PS.3

Students will evaluate plant growth requirements and develop a plant management plan.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.3.B: Prepare growing media for use in plant systems.	**AFNR.PS.3.B.b.1:** Identify categories of soil and other growing media.	**AFNR.PS.3.B.i.1:** Demonstrate how to properly prepare media for plant growth.	**AFNR.PS.3.B.a.1.a:** Formulate and prepare growing media for specific plants or crops. **AFNR.PS.3.B.a.1.b:** Produce a tissue-culture media. **AFNR.PS.3.B.a.1.c:** Prepare hydro-, aero-, and aquaponic growing media for production systems.
	AFNR.PS.3.B.b.2: Describe the physical characteristics of growing media, and explain the influences on plant growth.	**AFNR.PS.3.B.i.2.a:** Discuss how soil drainage and water-holding capacity can be improved. **AFNR.PS.3.B.i.2.b:** Determine hydraulic conductivity for soil and how results influence irrigation practices.	**AFNR.PS.3.B.a.2:** Evaluate characteristics of growing media that are ideal for a specific plant species.

Standard: AFNR.PS.3

Students will evaluate plant growth requirements and develop a plant management plan.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.3.C: Develop and implement a fertilization plan for specific plants in various production systems, including agronomy, fruit systems, gardens, nurseries, or CEA/greenhouse crops.	**AFNR.PS.3.C.b.1:** Describe what elements plants use for food.	**AFNR.PS.3.C.i.1:** Monitor plants for signs of nutrient deficiencies.	**AFNR.PS.3.C.a.1.a:** Distinguish between healthy and unhealthy plants. **AFNR.PS.3.C.a.1.b:** Describe nutrient deficiency symptoms, recognize environmental causes of nutrient deficiencies, and prepare a scouting report.
	AFNR.PS.3.C.b.2: Identify essential nutrients for plant growth and development, and describe major functions.	**AFNR.PS.3.C.i.2:** Collect soil and plant tissue samples for testing, and interpret test results.	**AFNR.PS.3.C.a.2.a:** Determine the nutrient content of plant tissue samples using appropriate laboratory procedures, and prescribe fertilization based on results. **AFNR.PS.3.C.a.2.b:** Determine the nutrient content of soil using appropriate laboratory procedures, and prescribe fertilization based on results.
	AFNR.PS.3.C.b.3: Identify fertilizer sources of essential plant nutrients.	**AFNR.PS.3.C.i.3:** Explain fertilizer formulations.	**AFNR.PS.3.C.a.3:** Prescribe fertilizer rates for a plant species in a growing system.

Standard: AFNR.PS.3

Students will evaluate plant growth requirements and develop a plant management plan.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.3.C: Develop and implement a fertilization plan for specific plants in various production systems, including agronomy, fruit systems, gardens, nurseries, or CEA/greenhouse crops.	**AFNR.PS.3.C.b.4:** Examine fertilizer consumer goods for basic use, storage, application, and safety protocols.	**AFNR.PS.3.C.i.4:** Research application rates and frequency for plant production systems.	**AFNR.PS.3.C.a.4:** Calculate the amount of fertilizer to be applied, and calibrate equipment to apply the prescribed amount of fertilizer.
		AFNR.PS.3.C.i.5: Describe different methods of fertilizer application.	**AFNR.PS.3.C.a.5:** Use variable-rate technology to apply fertilizers to meet crop nutrient needs.
	AFNR.PS.3.C.b.6: Discuss the influence of pH and cation exchange capacity on nutrient availability.	**AFNR.PS.3.C.i.6:** Contrast pH and cation exchange capacity between mineral soil and soilless growing media.	**AFNR.PS.3.C.a.6:** Adjust the pH of growing media.

Standard: AFNR.PS.4

Students will propagate, culture, harvest, and market plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.4.A: Demonstrate plant propagation techniques.	**AFNR.PS.4.A.b.1:** Demonstrate sowing techniques and provide favorable conditions for seed germination.	**AFNR.PS.4.A.i.1.a:** Explain pollination, cross-pollination, and self-pollination of flowering plants. **AFNR.PS.4.A.i.1.b:** Handle seed to overcome seed dormancy mechanisms and to maintain seed viability and vigor.	**AFNR.PS.4.A.a.1:** Design and implement a plan to control the pollination of plants.
	AFNR.PS.4.A.b.2: Diagram the process of plant fertilization.	**AFNR.PS.4.A.i.2:** Conduct tests associated with seed germination rates, viability, and vigor.	**AFNR.PS.4.A.a.2:** Design and implement a plan to control plant fertilization based on business requirements.
	AFNR.PS.4.A.b.3: Identify asexual propagation practices.	**AFNR.PS.4.A.i.3.a:** Research proper herbaceous, softwood, and hardwood cutting techniques and time-of-year for plant species.	**AFNR.PS.4.A.a.3.a:** Produce herbaceous, softwood, or hardwood cuttings. **AFNR.PS.4.A.a.3.b:** Evaluate asexual propagation practices based on productivity and efficiency.

Standard: AFNR.PS.4

Students will propagate, culture, harvest, and market plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.4.A: Demonstrate plant propagation techniques.		**AFNR.PS.4.A.i.3.b:** Describe optimal conditions for asexual propagation, and demonstrate techniques used to propagate plants by cuttings, division, separation, and layering. **AFNR.PS.4.A.i.3.c:** Define micropropagation, discuss advantages associated with the practice, and outline four main stages of the process.	**AFNR.PS.4.A.a.3.c:** Demonstrate proper procedures in budding or grafting selected materials. **AFNR.PS.4.A.a.3.d:** Propagate plants by micropropagation using aseptic techniques.
	AFNR.PS.4.A.b.4: Explain principles behind recombinant DNA technology and basic steps in process.	**AFNR.PS.4.A.i.4:** Give examples of risks and advantages associated with genetically modified plants.	**AFNR.PS.4.A.a.4:** Evaluate performance of genetically modified crops.
AFNR.PS.4.B: Develop and implement a plant-management plan for crop production.	**AFNR.PS.4.B.b.1:** Identify acceptable media for growing plants.	**AFNR.PS.4.B.i.1:** Explain reasons for preparing growing media before planting.	**AFNR.PS.4.B.a.1:** Prepare growing media for planting with the addition of amendments.
	AFNR.PS.4.B.b.2: Explain the importance of starting with pest- and disease-free propagation material.	**AFNR.PS.4.B.i.2:** Inspect propagation material for evidence of pests or disease.	**AFNR.PS.4.B.a.2:** Produce pest- and disease-free propagation material.

Standard: AFNR.PS.4

Students will propagate, culture, harvest, and market plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.4.B: Develop and implement a plant-management plan for crop production.	**AFNR.PS.4.B.b.3:** Identify proper planting procedures and post-planting care.	**AFNR.PS.4.B.i.3:** Demonstrate proper planting procedures and post-planting care.	**AFNR.PS.4.B.a.3.a:** Apply pre-plant treatments required of seeds and plants, and evaluate results. **AFNR.PS.4.B.a.3.b:** Observe and record environmental conditions during germination, growth, and development of a crop. **AFNR.PS.4.B.a.3.c:** Monitor progress of plantings, and determine the need to adjust environmental conditions. **AFNR.PS.4.B.a.3.d:** Operate mechanized planting equipment.
	AFNR.PS.4.B.b.4: Explain reasons for controlling plant growth.	**AFNR.PS.4.B.i.4.a:** Prepare and implement a plant-production schedule based on predicted environmental conditions. **AFNR.PS.4.B.i.4.b:** Demonstrate proper techniques to control and manage plant growth through mechanical, cultural, or chemical means.	**AFNR.PS.4.B.a.4:** Create and implement a plan to control and manage plant growth.

Standard: AFNR.PS.4

Students will propagate, culture, harvest, and market plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.4.C: Develop and implement a plan for integrated pest management (IPM).	**AFNR.PS.4.C.b.1:** Identify major local weeds, insect pests, and infectious and noninfectious plant diseases.	**AFNR.PS.4.C.i.1.a:** Describe damage caused by plant pests and diseases. **AFNR.PS.4.C.i.1.b:** Diagram life cycles of major plant pests and diseases.	**AFNR.PS.4.C.a.1:** Design and implement a crop scouting program.
	AFNR.PS.4.C.b.2: Identify and describe pest control strategies associated with integrated pest management.	**AFNR.PS.4.C.i.2.a:** Describe types of pesticide controls and formulations. **AFNR.PS.4.C.i.2.b:** Explain risks and benefits associated with materials and methods used in plant-pest management. **AFNR.PS.4.C.i.2.c:** Explain procedures for the safe handling, use, and storage of pesticides. **AFNR.PS.4.C.i.2.d:** Evaluate environmental and consumer concerns regarding pest-management strategies.	**AFNR.PS.4.C.a.2:** Create a pest management plan, assess effectiveness of the plan, and adjust the plan as needed.
	AFNR.PS.4.C.b.3: Identify the components of the disease triangle.	**AFNR.PS.4.C.i.3:** Predict pest and disease problems based on environmental conditions and life cycles.	

Standard: AFNR.PS.4

Students will propagate, culture, harvest, and market plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.4.D: Apply principles and practices of sustainable agriculture to plant production.	**AFNR.PS.4.D.b.1:** Define "sustainability."	**AFNR.PS.4.D.i.1.a:** Explain sustainable agriculture and objectives associated with the strategy. **AFNR.PS.4.D.i.1.b:** Describe sustainable agriculture practices, and compare ecological effects of traditional agricultural practices with those of sustainable agriculture.	**AFNR.PS.4.D.a.1:** Prepare and implement a plan for an agricultural enterprise involving practices supporting sustainable agriculture.
AFNR.PS.4.E: Harvest, handle, and store crops.	**AFNR.PS.4.E.b.1:** Describe how agricultural crops travel from farm to table.	**AFNR.PS.4.E.i.1:** Identify harvesting methods and harvesting equipment.	**AFNR.PS.4.E.a.1.a:** Assess the stage of growth to determine crop maturity or salability and demonstrate proper harvesting techniques. **AFNR.PS.4.E.a.1.b:** Operate mechanized harvesting equipment.
		AFNR.PS.4.E.i.2: Identify storage methods for plants and plant products.	**AFNR.PS.4.E.a.2.a:** Explain the proper conditions to maintain the quality of plants and plant products held in storage.

Standard: AFNR.PS.4

Students will propagate, culture, harvest, and market plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.4.E: Harvest, handle, and store crops.			**AFNR.PS.4.E.a.2.b:** Monitor environmental conditions in storage facilities for plants and plant products.
		AFNR.PS.4.E.i.3: Explain reasons for calculating crop yield and loss.	**AFNR.PS.4.E.a.3.a:** Evaluate crop yield-and-loss data. **AFNR.PS.4.E.a.3.b:** Implement plans to reduce crop loss.
		AFNR.PS.4.E.i.4: Explain reasons for preparing plants and plant products for distribution.	**AFNR.PS.4.E.a.4:** Demonstrate techniques for grading, handling, and packaging plants and plant products for distribution.
		AFNR.PS.4.E.i.5: Evaluate techniques for grading, handling, and packaging plants and plant products.	**AFNR.PS.4.E.a.5:** Compare and contrast plant- and plant-product packaging.
AFNR.PS.4.F: Market plant products to a target customer.	**AFNR.PS.4.F.b.1:** Research plant marketing techniques.	**AFNR.PS.4.F.i.1.a:** Compare and contrast marketing techniques for plants and plant products.	**AFNR.PS.4.F.a.1:** Collaborate with a team to market a product.

Standard: AFNR.PS.4

Students will propagate, culture, harvest, and market plants.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.4.F: Market plant products to a target customer.		**AFNR.PS.4.F.i.1.b:** Select plant-marketing techniques for a plant-production system. **AFNR.PS.4.F.i.1.c:** Forecast sales of a plant crop.	
	AFNR.PS.4.F.b.2: Identify point-of-sale systems utilized in a plant system.	**AFNR.PS.4.F.i.2:** Examine the logistics of moving plants and plant products from enterprise to consumer.	**AFNR.PS.4.F.a.2:** Create a sales plan or moving plan for a plant sales operation.
	AFNR.PS.4.F.b.3: Discuss how a plant needs to be presented to a consumer.	**AFNR.PS.4.F.i.3.a:** Research consumer trends in plant species purchases.	**AFNR.PS.4.F.a.3:** Communicate with customers in a plant- or plant-product sales scenario.
		AFNR.PS.4.F.i.3.b: Appraise and analyze the quality of a plant or plant product.	

Standard: AFNR.PS.5

Students will recognize different systems in which plants grow.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.5.A: Investigate various means to grow plants.	**AFNR.PS.5.A.b.1:** Identify various places plants grow.	**AFNR.PS.5.A.i.1:** Compare and contrast various plant growing systems including, but not limited to, CEA/greenhouse, hydroponics, aquaponics, agronomy fields, nursery plots or fields, orchards, vineyards, other small fruits, and other emerging production.	**AFNR.PS.5.A.a.1:** Model a growing system.
	AFNR.PS.5.A.b.2: Explore agronomic production systems for growing plants.	**AFNR.PS.5.A.i.2.a:** Measure plant growth in a growing system. **AFNR.PS.5.A.i.2.b:** Measure environmental factors needed in a growing system. **AFNR.PS.5.A.i.2.c:** Interview local industry partners for various plant-production systems.	**AFNR.PS.5.A.a.2:** Compare and contrast how different growing systems can have an impact on a production system.
AFNR.PS.5.B: Design, build, construct, and prepare plant-production systems.	**AFNR.PS.5.B.b.1:** Select a production system for a plant species.	**AFNR.PS.5.B.i.1:** Compare and contrast production systems.	**AFNR.PS.5.B.a.1:** Collaborate to create a plant-production system for a crop.

Standard: AFNR.PS.5

Students will recognize different systems in which plants grow.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.5.C: Manage a plant-production system.	**AFNR.PS.5.C.b.1:** Recognize tasks that need to be completed in a plant-production system.	**AFNR.PS.5.C.i.1.a:** Summarize job duties in a plant-production system.	**AFNR.PS.5.C.a.1:** Manage a plant growing system: agronomy fields, greenhouses, growth chambers, permaculture, etc.
		AFNR.PS.5.C.i.1.b: Investigate careers in plant production systems.	
	AFNR.PS.5.C.b.2: Identify input needs for a plant-production system.	**AFNR.PS.5.C.i.2:** Calculate input needs for a plant-production system.	
AFNR.PS.5.D: Manage equipment in a plant-production system.	**AFNR.PS.5.D.b.1.a:** Identify equipment needs for a plant-production system. **AFNR.PS.5.D.b.1.b:** Investigate equipment safety protocols and operation standards of use.	**AFNR.PS.5.D.i.1.a:** Research equipment needs and use for a plant-production system. **AFNR.PS.5.D.i.1.b:** Apply equipment safety protocol and operation standards of use.	**AFNR.PS.5.D.a.1:** Perform plant-production tasks using equipment safely and properly according to documented training protocols.

Standard: AFNR.PS.6

Students will employ elements of design to enhance an environment.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.6.A: Create landscape designs using plants.	**AFNR.PS.6.A.b.1:** Define and identify design elements relevant to landscapes.	**AFNR.PS.6.A.i.1:** Locate the design elements in a landscape.	**AFNR.PS.6.A.a.1:** Apply design principals to a landscape design.
	AFNR.PS.6.A.b.2: Discuss applications of art in agriculture and horticulture.	**AFNR.PS.6.A.i.2:** Classify plants used in landscaping.	**AFNR.PS.6.A.a.2:** Add landscaping plants to a landscape design based on classification and plant needs.
	AFNR.PS.6.A.b.3: Describe materials used with plants in a landscape design.	**AFNR.PS.6.A.i.3:** Discuss the benefits and disadvantages of each material.	**AFNR.PS.6.A.a.3:** Add landscaping materials to a landscape design based on the needs of the project.
	AFNR.PS.6.A.b.4: Describe items used in a landscape design that are not plants.	**AFNR.PS.6.A.i.4.a:** Analyze a landscape for functionality, design, and purpose. **AFNR.PS.6.A.i.4.b:** Calculate the value of a landscape.	**AFNR.PS.6.A.a.4:** Install a landscape design utilizing turf, hardscape elements, water features, or lighting features to industry standards based on functionality, design elements, and purpose.
AFNR.PS.6.B: Create floral and other non-landscape designs using plants.	**AFNR.PS.6.B.b.1:** Define and identify design elements relevant to floral and other non-landscape designs using plants.	**AFNR.PS.6.B.i.1:** Locate the design elements in non-landscaping designs.	**AFNR.PS.6.B.a.1:** Apply design principals to non-landscaping arrangements.

Standard: AFNR.PS.6

Students will employ elements of design to enhance an environment.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.6.B: Create floral and other non-landscape designs using plants.	**AFNR.PS.6.B.b.2:** Discuss applications of art in agriculture and horticulture.	**AFNR.PS.6.B.i.2:** Compare and contrast applications of horticulture.	**AFNR.PS.6.B.a.2:** Design art applications in agriculture for urban settings.
	AFNR.PS.6.B.b.3: Explain how plants can be used to improve the appearance of an environment.	**AFNR.PS.6.B.i.3:** Classify plants used in floral design, urban horticulture, and other emerging plant systems.	**AFNR.PS.6.B.a.3:** Design an urban horticulture arrangement.
	AFNR.PS.6.B.b.4: Describe materials used with plants in a floral design.	**AFNR.PS.6.B.i.4.a:** Analyze a floral design, interior scape, floral arrangement, or other design using plants. **AFNR.PS.6.B.i.4.b:** Calculate value of a floral product design.	**AFNR.PS.6.B.a.4.a:** Create a non-landscape design using plants. **AFNR.PS.6.B.a.4.b:** Create a bill of sale for a non-landscape design.

Standard: AFNR.PS.7

Students will gain agricultural skills through a plant systems Supervised Agricultural Experience (SAE) Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PS.7.A: Evaluate and implement steps and requirements to pursue a career opportunity in an AFNR career pathway.	**AFNR.PS.7.A.b.1:** Identify and summarize steps to pursue a career in an AFNR pathway.	**AFNR.PS.7.A.i.1:** Create a personal plan outlining goals and steps to obtain a career in AFNR pathway.	**AFNR.PS.7.A.a.1:** Evaluate progress toward AFNR career goals, and identify opportunities for improvement and necessary adjustments to an individual career plan.
	AFNR.PS.7.A.b.2: Examine educational, training, and experiential requirements to pursue a career in an AFNR pathway.	**AFNR.PS.7.A.i.2:** Analyze a personal skill set and add to career plan options for attaining required education, training, and experiences to obtain a career in an AFNR pathway.	**AFNR.PS.7.A.a.2:** Evaluate, update, and improve a set of personal tools to reflect current skills, experiences, education, and goals, and complete processes needed to pursue and obtain a career in an AFNR pathway.
AFNR.PS.7.B: Examine and choose career opportunities matched to personal skills, talents, and career goals in an AFNR pathway of interest.	**AFNR.PS.7.B.b.1:** Research and describe careers in each of the AFNR pathways, and choose potential careers connecting to personal interests and skills.	**AFNR.PS.7.B.i.1:** Assemble and analyze examples of careers and related statistics on local, state, national, and global levels.	**AFNR.PS.7.B.a.1:** Conduct interviews with career professionals within the AFNR pathways, and summarize the results.
AFNR.PS.7.C: Connect and apply academic learning, knowledge, and technical skills to solve problems through a Supervised Agriculture Experience (SAE).		**AFNR.PS.7.C.i.1:** Identify opportunities to apply cross-curricular academic learning and technical skills to an SAE.	**AFNR.PS.7.C.a.1:** Practice applying academic knowledge and technical skills in an SAE, and reflect on the results achieved.

Strand: Power, Structural, and Mechanical Technology (PSMT)

Standard: AFNR.PSMT.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of power, structural, and mechanical technology systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.PSMT.1.A: Examine components of the power, structural, and mechanical technology (PSMT) systems industry.	**AFNR.PSMT.1.A.b.1:** Categorize tools, machinery, and skills into the PMST industry.		**AFNR.PSMT.1.A.a.1:** Engage with professionals in the PSMT industry.
AFNR.PSMT.1.B: Research and communicate historical developments of power, structure, and mechanical technology (PSMT) systems and contribution to the development of agriculture.	**AFNR.PSMT.1.B.b.1:** Investigate significant historical milestones and inventors in the PSMT industries.	**AFNR.PSMT.1.B.i.1:** Develop a timeline of historical developments in the PSMT industries.	**AFNR.PSMT.1.B.a.1:** Compare modern technologies and trends to former significant technologies and trends in the PSMT industries.
AFNR.PSMT.1.C: Understand the importance of agricultural power, structures, and mechanical systems to local, state, national, and global economies.	**AFNR.PSMT.1.C.b.1:** Identify the current economic impacts of a PSMT industry at the local, state, and national level.	**AFNR.PSMT.1.C.i.1:** Examine imports and exports of goods within the PSMT industries.	**AFNR.PSMT.1.C.a.1:** Compare the United States' PSMT systems economy to the global PSMT systems economies.
AFNR.PSMT.1.D: Evaluate the significance and implications of changes and trends in power, structure, and mechanical technology (PSMT) systems.	**AFNR.PSMT.1.D.b.1:** Investigate future trends in PSMT industries.	**AFNR.PSMT.1.D.i.1:** Evaluate the positives and negatives of future trends in the PSMT industries.	**AFNR.PSMT.1.D.a.1:** Select and apply a new technology to an AFNR project.

Standard: AFNR.PSMT.1

Students will examine components, applications, historical development, global implications, future trends, and career opportunities of power, structural, and mechanical technology systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.1.E: Use measuring tools and test instruments in an AFNR power, structural, and mechanical technology application.	**AFNR.PSMT.1.E.b.1:** Identify measuring tools and test instruments utilized in power, structural, and mechanical technology applications.	**AFNR.PSMT.1.E.i.1:** Match measuring scenarios with the appropriate device needed to complete the measurements.	**AFNR.PSMT.1.E.a.1:** Complete accurate measurement using a variety of measuring tools.
AFNR.PSMT.1.F: Explore career fields and opportunities of power, structural, and mechanical technology (PSMT) systems industry.	**AFNR.PSMT.1.F.b.1:** Identify careers related to PSMT systems.	**AFNR.PSMT.1.F.i.1:** Examine careers related to PSMT systems.	**AFNR.PSMT.1.F.a.1:** Develop career plans related to PSMT systems.
AFNR.PSMT.1.G: Communicate and work effectively in power, structural, and mechanical technology settings with individuals and groups representing diverse backgrounds and abilities	**AFNR.PSMT.1.G.b.1:** Identify barriers to effective communication in power, structural, and mechanical technology settings based on diverse backgrounds and abilities.	**AFNR.PSMT.1.G.i.1:** Develop plans to communicate and work effectively in power, structural, and mechanical technology settings with individuals and groups representing diverse backgrounds and abilities.	**AFNR.PSMT.1.G.a.1:** Implement plans to communicate and work effectively in power, structural, and mechanical technology settings with individuals and groups representing diverse backgrounds and abilities.

Standard: AFNR.PSMT.2

Students will work safely with hand, stationary, and portable power tools.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.2.A: Recognize and prevent hazards in work areas.	**AFNR.PSMT.2.A.b.1.a:** Maintain the work area. **AFNR .PSMT.2.A.b.1.b:** Recognize hazards in work area. **AFNR.PSMT.2.A.b.1.c:** Properly clean benches, machines, and floors.	**AFNR.PSMT.2.A.i.1.a:** Evaluate Occupational Safety and Health Administration (OSHA) regulations as they relate to the workplace. **AFNR.PSMT.2.A.i.1.b:** Discuss first-aid and emergency procedures in PSMT settings.	**AFNR.PSMT.2.A.a.1:** Perform a safety assessment for class or an SAE project.
	AFNR.PSMT.2.A.b.2: Store materials and tools properly.	**AFNR.PSMT.2.A.i.2:** Interpret safety data sheets (SDS) for safe storage and handling of materials.	**AFNR.PSMT.2.A.a.2:** Perform a safety assessment for class or an SAE project.
AFNR.PSMT.2.B: Utilize a variety of measuring tools used in AFNR power, structural, and mechanical technology (PSMT) applications.	**AFNR.PSMT.2.B.b.1:** Identify measuring tools used in AFNR settings.	**AFNR.PSMT.2.B.i.1:** Compare measuring tools used in AFNR settings.	**AFNR.PSMT.2.B.a.1.a:** Utilize a variety of measuring and layout tools used in AFNR PSMT applications. **AFNR.PSMT.2.B.a.1.b:** Make and use a pattern in an AFNR PSMT application.
AFNR.PSMT.2.C: Select appropriate clothing and safety equipment for personal protection.	**AFNR.PSMT.2.C.b.1:** Identify personal protective equipment (PPE) for specific AFNR settings.	**AFNR.PSMT.2.C.i.1:** Evaluate OSHA regulations as they relate to PPE.	**AFNR.PSMT.2.C.a.1:** Select appropriate clothing and safety equipment for personal protection for a class or an SAE project.

Standard: AFNR.PSMT.2

Students will work safely with hand, stationary, and portable power tools.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.2.D: Identify and select commonly used fasteners and hardware for various PSMT uses.	**AFNR.PSMT.2.D.b.1:** Identify commonly used fasteners and hardware for various PSMT uses.	**AFNR.PSMT.2.D.i.1:** Compare commonly used fasteners and hardware for various PSMT uses.	**AFNR.PSMT.2.D.a.1:** Select and install correct fasteners and hardware for a specific AFNR project.
AFNR.PSMT.2.E: Utilize and maintain hand tools and power tools using recommended procedures and safety precautions.	**AFNR.PSMT.2.E.b.1.a:** Identify and describe the use of hand and power tools and equipment. **AFNR.PSMT.2.E.b.1.b:** Classify tools according to their use.	**AFNR.PSMT.2.E.i.1.a:** Operate hand and power tools and equipment to cut and shape materials. **AFNR.PSMT.2.E.i.1.b:** Join and assemble wood and metal parts. **AFNR.PSMT.2.E.i.1.c:** Prepare wood and metal for painting or applying other finishes.	**AFNR.PSMT.2.E.a.1.a:** Analyze a need to select and correctly use appropriate hand tools and power equipment. **AFNR.PSMT.2.E.a.1.b:** Assess the performance of employees in the use of hand and power tools to safely and efficiently service, construct, and fabricate quality products. **AFNR.PSMT.2.E.a.1.c:** Evaluate the performance of a hand or power tool, and provide proper maintenance or repairs as necessary.

Standard: AFNR.PSMT.3

Students will safely use, service, and maintain AFNR power sources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.3.A: Identify and explain principles of operation of AFNR power and mechanical systems.	**AFNR.PSMT.3.A.b.1:** Discuss the use of engines and motors.	**AFNR.PSMT.3.A.i.1.a:** Observe safety precautions when working around engines and motors. **AFNR.PSMT.3.A.i.1.b:** Compare and contrast different types of engines and motors. **AFNR.PSMT.3.A.i.1.c:** Identify the mechanical systems found in engines and motors.	**AFNR.PSMT.3.A.a.1.a:** Safely operate equipment powered by an engine or motor. **AFNR.PSMT.3.A.a.1.b:** Demonstrate the operation of varying engines and motors. **AFNR.PSMT.3.A.a.1.c:** Explain how various mechanical systems interrelate in engine and motor operation.
AFNR.PSMT.3.B: Service and repair AFNR power equipment.	**AFNR.PSMT.3.B.b.1:** Describe the features, benefits, and applications of common types of hydraulic systems.	**AFNR.PSMT.3.B.i.1.a:** Describe principles of hydraulic system operation. **AFNR.PSMT.3.B.i.1.b:** Identify major components of hydraulic systems, and describe their use. **AFNR.PSMT.3.B.i.1.c:** Identify hydraulic system fittings and ports.	**AFNR.PSMT.3.B.a.1.a:** Use symbols and schematic drawings in the maintenance of hydraulic systems. **AFNR.PSMT.3.B.a.1.b:** Inspect, analyze, and repair hydraulic system components, including fluid and compressed-air conveyance components. **AFNR.PSMT.3.B.a.1.c:** Use a pressure-and-flow tester in diagnosing malfunctions and repairing hydraulic systems.

Standard: AFNR.PSMT.3

Students will safely use, service, and maintain AFNR power sources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.3.B: Service and repair AFNR power equipment.	**AFNR.PSMT.3.B.b.2:** Describe the features, benefits, and applications of common types of pneumatic systems.	**AFNR.PSMT.3.B.i.2.a:** Describe principles of pneumatic-system operation. **AFNR.PSMT.3.B.i.2.b:** Identify major components of pneumatic systems and describe their use. **AFNR.PSMT.3.B.i.2.c:** Identify pneumatic-system fittings and ports.	**AFNR.PSMT.3.B.a.2.a:** Use symbols and schematic drawings in the maintenance of pneumatics systems. **AFNR.PSMT.3.B.a.2.b:** Inspect, analyze, and repair pneumatic-system components, including fluid and compressed-air conveyance components. **AFNR.PSMT.3.B.a.2.c:** Use a pressure-and-flow tester in diagnosing malfunctions and repairing pneumatic systems.
	AFNR.PSMT.3.B.b.3: Identify components of transmissions and drive trains, electrical and ignition systems, intake and exhaust systems, and heating and cooling systems in AFNR power equipment.	**AFNR.PSMT.3.B.i.3:** Use technical manuals and computer-based diagnostics in analysis and repair of AFNR power equipment.	**AFNR.PSMT.3.B.a.3:** Analyze, troubleshoot, and performance-test AFNR power equipment to determine service and repair needs.

Standard: AFNR.PSMT.3

Students will safely use, service, and maintain AFNR power sources.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.3.B: Service and repair AFNR power equipment.	**AFNR.PSMT.3.B.b.4:** Describe the operation of transmissions and drive trains, electrical and ignition systems, intake and exhaust systems, and heating and cooling systems in AFNR power equipment.	**AFNR.PSMT.3.B.i.4:** Identify tools used to repair AFNR power equipment.	**AFNR.PSMT.3.B.a.4:** Use the proper tools to safely service and repair AFNR power equipment.
AFNR.PSMT.3.C: Select, store, and dispose of fuels, lubricants, hydraulic fluids, and coolants used in AFNR power and mechanical technology systems.	**AFNR.PSMT.3.C.b.1:** Identify the sources and importance of fuels, lubricants, hydraulic fluids, and coolants.	**AFNR.PSMT.3.C.i.1:** Compare fuels, lubricants, hydraulic fluids, and coolants.	**AFNR.PSMT.3.C.a.1:** Appropriately select, use, and dispose of fuels, lubricants, hydraulic fluids, and coolants.

Standard: AFNR.PSMT.4

Students will safely use, maintain, and repair AFNR implements and machinery.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.4.A: Safely attach and adjust implements to AFNR power sources.	**AFNR.PSMT.4.A.b.1:** Identify implement attachments to AFNR power sources.	**AFNR.PSMT.4.A.i.1:** Locate safety warnings, dangers, and caution areas on equipment and in the operation manuals.	**AFNR.PSMT.4.A.a.1:** Safely attach and adjust implements for safe and efficient operation.

Standard: AFNR.PSMT.4

Students will safely use, maintain, and repair AFNR implements and machinery.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.4.B: Perform service routines to maintain and repair power units and equipment.	**AFNR.PSMT.4.B.b.1:** Identify agricultural equipment such as tractors, mowers, discs, and wagons.	**AFNR.PSMT.4.B.i.1:** Identify a maintenance schedule for power equipment.	**AFNR.PSMT.4.B.a.1:** Test and service mechanical systems.
	AFNR.PSMT.4.B.b.2: Maintain the cleanliness and appearance of power units and equipment to assure functionality.	**AFNR.PSMT.4.B.i.2:** Service filtration systems, and maintain fluid levels on power units and equipment.	**AFNR.PSMT.4.B.a.2:** Adjust and troubleshoot equipment, including belts and drives, chains and sprockets, and maintain fluid conveyance components, such as hoses, lines, and nozzles, using computer and on-board diagnostics.
		AFNR.PSMT.4.B.i.3: Develop a preventive maintenance schedule for power units and equipment.	**AFNR.PSMT.4.B.a.3:** Maintain and calibrate metering, monitoring, and sensing devices on equipment.
		AFNR.PSMT.4.B.i.4: Identify the power unit and equipment controls and instruments, along with their functions.	**AFNR.PSMT.4.B.a.4:** Perform start-up and shutdown procedures on power units and equipment as specified in technical manuals.
	AFNR.PSMT.4.B.b.5: Demonstrate safe practices around power units and equipment.	**AFNR.PSMT.4.B.i.5:** Locate safety warnings, dangers, and caution areas on equipment and in the operation manuals.	**AFNR.PSMT.4.B.a.5:** Adjust equipment for safe and efficient operation.

Standard: AFNR.PSMT.4

Students will safely use, maintain, and repair AFNR implements and machinery.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.4.C: Use onboard computerized systems to monitor, test, store, and report equipment operation.	**AFNR.PSMT.4.C.b.1:** Identify and locate icons and buttons on the computerized system.	**AFNR.PSMT.4.C.i.1:** Analyze data generated by the onboard computerized system.	**AFNR.PSMT.4.C.a.1:** Interpret and communicate data from onboard computerized systems to monitor, test, store, and report equipment operation.
AFNR.PSMT.4.D: Adjust or calibrate chemical application, seeding, fertilizing, harvesting, processing, and material-handling equipment.	**AFNR.PSMT.4.D.b.1:** Describe methods of chemical application, seeding, fertilizing, harvesting, processing, material-handling equipment.	**AFNR.PSMT.4.D.i.1:** Calculate chemical rates, seeding rates, fertilizer rates, and yield estimates and losses.	**AFNR.PSMT.4.D.a.1:** Adjust or calibrate chemical application, seeding, fertilizing, harvesting, processing, and material-handling equipment.
AFNR.PSMT.4.E: Utilize tractors, machinery, and implements.	**AFNR.PSMT.4.E.b.1:** Identify steps to start, stop, and operate tractors, machinery, and implements.	**AFNR.PSMT.4.E.i.1:** Demonstrate safe operation of tractors, machinery, and implements.	**AFNR.PSMT.4.E.a.1.a:** Start, stop, and operate tractors, machinery, and implements safely. **AFNR.PSMT.4.E.a.1.b:** Prepare a tractor and machinery safety demonstration for an individual or group.

Standard: AFNR.PSMT.5

Students will plan and construct AFNR structures.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.5.A: Investigate the use and function of AFNR structures.	**AFNR.PSMT.5.A.b.1:** Explore the uses of pole sheds and other AFNR structures.	**AFNR.PSMT.5.A.i.1:** Compare styles of pole sheds and other AFNR structures.	**AFNR.PSMT.5.A.a.1:** Install or repair pole sheds and other AFNR structures.
	AFNR.PSMT.5.A.b.2: Explore the use of greenhouses, aquaculture, aquaponics, and hydroponics structures.	**AFNR.PSMT.5.A.i.2:** Compare styles of greenhouses, aquaculture, aquaponics, and hydroponics structures.	**AFNR.PSMT.5.A.a.2:** Install, repair, and maintain greenhouses, aquaculture, aquaponics, and hydroponics structures.
AFNR.PSMT.5.B: Create and interpret sketches and plans for AFNR structures.	**AFNR.PSMT.5.B.b.1.a:** Identify and sketch various agriculture structures. **AFNR.PSMT.5.B.b.1.b:** Interpret sketches and plans.	**AFNR.PSMT.5.B.i.1.a:** Develop plans and sketches using drafting equipment and computer programs. **AFNR.PSMT.5.B.i.1.b:** Create a bill of materials.	**AFNR.PSMT.5.B.a.1.a:** Use scale measurement and dimension to develop plans and sketches. **AFNR.PSMT.5.B.a.1.b:** Use a sketch or plan to construct and assemble a structure.
AFNR.PSMT.5.C: Plan and safely install plumbing, electrical, masonry, concrete, etc. components of AFNR structures.	**AFNR.PSMT.5.C.b.1:** Identify insulation materials and methods to achieve desired R-value.	**AFNR.PSMT.5.C.i.1:** Compare insulation materials and methods to achieve desired R-value.	**AFNR.PSMT.5.C.a.1:** Insulate a structure. Calculate BTU loss.
	AFNR.PSMT.5.C.b.2: Identify electricity measurements, and make measurement calculations.	**AFNR.PSMT.5.C.i.2:** Distinguish electrical circuits and components of each.	**AFNR.PSMT.5.C.a.2:** Install or repair electrical wiring components and fixtures following appropriate codes and standards.

Standard: AFNR.PSMT.5

Students will plan and construct AFNR structures.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.5.C: Plan and safely install plumbing, electrical, masonry, concrete, etc. components of AFNR structures.	**AFNR.PSMT.5.C.b.3:** Identify types of pipe fittings utilized in plumbing systems.	**AFNR.PSMT.5.C.i.3:** Assess or review a space to create or modify a plan for installing necessary plumbing.	**AFNR.PSMT.5.C.a.3:** Install or repair pipes and plumbing equipment and fixtures.
	AFNR.PSMT.5.C.b.4: Identify masonry and concrete tools and materials.	**AFNR.PSMT.5.C.i.4:** Calculate volume or quantities for concrete and masonry projects.	**AFNR.PSMT.5.C.a.4:** Construct or repair with concrete, brick, stone, or masonry units.
AFNR.PSMT.5.D: Select and apply finishes, stains, and metal or plastic coverings on AFNR structures.	**AFNR.PSMT.5.D.b.1:** Describe finishes, stains, and metal or plastic coverings for AFNR structures.	**AFNR.PSMT.5.D.i.1:** Compare finishes, stains, and metal or plastic coverings for an AFNR structure.	**AFNR.PSMT.5.D.a.1:** Select and apply finishes, stains, and metal or plastic coverings on an AFNR structure.
AFNR.PSMT.5.E: Identify and select types of agricultural fences, and explain how fences are constructed and maintained.	**AFNR.PSMT.5.E.b.1:** Identify various fencing materials.	**AFNR.PSMT.5.E.i.1:** Measure and calculate fencing materials.	**AFNR.PSMT.5.E.a.1:** Construct or repair fencing, including wood, static wire, electrical wire, and other fencing materials.
AFNR.PSMT.5.F: Research local building codes, and apply to AFNR structures.	**AFNR.PSMT.5.F.b.1:** Research local building codes, and apply to AFNR structures.	**AFNR.PSMT.5.F.i.1:** Interpret local building codes, and apply to AFNR structures.	**AFNR.PSMT.5.F.a.1:** Repair or install AFNR structures according to local building codes.

Standard: AFNR.PSMT.6

Students will apply knowledge of metals and metalworking to power, structure, and mechanical technology (PSMT) systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.6.A: Identify various metals, and select for use in AFNR structures and repairs.	**AFNR.PSMT.6.A.b.1:** Identify various metals, and select for use in AFNR structures and repairs.	**AFNR.PSMT.6.A.i.1:** Compare qualities of the various metals used in AFNR structures.	**AFNR.PSMT.6.A.a.1:** Select metal for use in AFNR structures and repairs.
AFNR.PSMT.6.B: Mark, cut, form, and fasten metal.	**AFNR.PSMT.6.B.b.1:** Identify methods to mark, cut, form, and fasten metal.	**AFNR.PSMT.6.B.i.1:** Compare methods to mark, cut, form, and fasten metal.	**AFNR.PSMT.6.B.a.1.a:** Select and utilize the correct tools to mark, cut, form, and fasten metal. **AFNR.PSMT.6.B.a.1.b:** Select and utilize the correct tools to drill holes, and tap and cut threads in holes on pipe and rod. **AFNR.PSMT.6.B.a.1.c:** Select and utilize proper tools to sweat pipe and solder sheet metal.
AFNR.PSMT.6.C: Read welding plans, and interpret welding symbols.	**AFNR.PSMT.6.C.b.1.a:** Identify key components of a welding plan. **AFNR.PSMT.6.C.b.1.b:** Identify and interpret welding symbols. **AFNR.PSMT.6.C.b.1.c:** Identify and interpret size and dimension markings.	**AFNR.PSMT.6.C.i.1:** Describe the structure and placement of welding symbols within a welding plan.	**AFNR.PSMT.6.C.a.1:** Utilize and carry out a welding plan.

Standard: AFNR.PSMT.6

Students will apply knowledge of metals and metalworking to power, structure, and mechanical technology (PSMT) systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.6.D: Safely and effectively use shielded metal arc (stick), gas metal arc (MIG), and gas tungsten arc (TIG) equipment and materials needed to construct and repair agricultural structures, equipment, implements, and machines.	**AFNR.PSMT.6.D.b.1:** Describe the arc welding process.	**AFNR.PSMT.6.D.i.1:** Distinguish types of welding processes and varying electric welders.	**AFNR.PSMT.6.D.a.1:** Select suitable supplies and equipment for welding.
	AFNR.PSMT.6.D.b.2: Identify welding equipment.	**AFNR.PSMT.6.D.i.2:** Recognize color and numerical code markings on electrodes.	**AFNR.PSMT.6.D.a.2:** Select electrodes for use in various arc welding applications.
	AFNR.PSMT.6.D.b.3: Identify safety equipment and protective clothing for welding.	**AFNR.PSMT.6.D.i.3:** Use safety equipment and protective clothing for welding.	**AFNR.PSMT.6.D.a.3:** Safely construct or repair metal structures and equipment using welding fabrication procedures, including those associated with SMAW, GMAW, GTAW, and plasma arc torch methods.
	AFNR.PSMT.6.D.b.4.a: Recognize various types of weld joints including groove, fillet, lap, corner joints, etc. **AFNR.PSMT.6.D.b.4.b:** Recognize various welding positions including flat, horizontal, vertical, overhead, etc.	**AFNR.PSMT.6.D.i.4.a:** Compare and contrast types of weld joints and uses of each. **AFNR.PSMT.6.D.i.4.b:** Compare and contrast various welding positions and uses of each.	**AFNR.PSMT.6.D.a.4.a:** Demonstrate through use of welding equipment and procedures bead, groove, fillet, lap, and corner welds in flat, horizontal, vertical, and overhead positions. **AFNR.PSMT.6.D.a.4.b:** Demonstrate special procedures for welding pipe and plate.

Standard: AFNR.PSMT.6

Students will apply knowledge of metals and metalworking to power, structure, and mechanical technology (PSMT) systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.6.E: Safely and effectively use oxy-fuel heating, cutting, and welding equipment and materials needed to construct and repair agricultural structures, equipment, implements, and machines.	**AFNR.PSMT.6.E.b.1:** Identify the parts of an oxy-fuel welding system.	**AFNR.PSMT.6.E.i.1.a:** Explain the uses of brazing and gas welding. **AFNR.PSMT.6.E.i.1.b:** Identify the parts of an oxy-fuel cutting system.	**AFNR.PSMT.6.E.a.1.a:** Braze and weld safely with oxy-fuel equipment. **AFNR.PSMT.6.E.a.1.b:** Use oxy-fuels and other gasses to cut metal.
	AFNR.PSMT.6.E.b.2: Describe the oxy-fuel welding process.	**AFNR.PSMT.6.E.i.2.:** Compare and contrast welding processes, positions, and materials preparation techniques.	**AFNR.PSMT.6.E.a.2:** Change, adjust, shut down, and monitor oxygen and fuel equipment and controls.
	AFNR.PSMT.6.E.b.3: Identify procedures to safely utilize oxy-fuel heating, cutting, and welding equipment.	**AFNR.PSMT.6.E.i.3:** Use safety equipment and protective clothing for welding.	**AFNR.PSMT.6.E.a.3:** Safely construct or repair metal structures and equipment using oxy-fuel heating, cutting, and welding fabrication procedures.
AFNR.PSMT.6.F: Utilize robotic welding systems to construct AFNR structures.	**AFNR.PSMT.6.F.b.1:** Discuss advantages and disadvantages of using robotic welding systems to construct AFNR structures.	**AFNR.PSMT.6.F.i.1:** Identify robotic welding systems used to construct AFNR structures.	**AFNR.PSMT.6.F.a.1:** Program a robotic welding system to construct an AFNR structure or part.

Standard: AFNR.PSMT.6

Students will apply knowledge of metals and metalworking to power, structure, and mechanical technology (PSMT) systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.PSMT.6.G: Cut metal with hand and CNC-guided plasma-cutting units.	**AFNR.PSMT.6.G.b.1.a:** Identify and compare procedures and equipment for plasma cutting metal. **AFNR.PSMT.6.G.b.1.b:** Identify procedures to safely plasma cut metal.	**AFNR.PSMT.6.G.i.1:** Properly set up and operate handheld and CNC-guided plasma-cutting equipment.	**AFNR.PSMT.6.G.a.1:** Safely plasma cut metal in the construction or repair of an agricultural structure, implement, or machine.

Standard: AFNR.PSMT.7

Students will apply knowledge of environmental and natural resource competencies to power, structure, and mechanical technology (PSMT) systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.PSMT.7.A: Identify and correct environmental problems in livestock, crop handling, and processing facilities.	**AFNR.PSMT.7.A.b.1:** Identify PST systems used to control water runoff, manure management and manure applications.	**AFNR.PSMT.7.A.i.1:** Interpret laws and regulations on water runoff, manure management and applications.	**AFNR.PSMT.7.A.a.1:** Manage manure and water runoff using PST systems. Apply manure using PST systems, according to laws and regulations.

Standard: AFNR.PSMT.7

Students will apply knowledge of environmental and natural resource competencies to power, structure, and mechanical technology (PSMT) systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.7.B: Use technology and tools to access, read, and interpret maps and data applications related to environmental and natural resources.	**AFNR.PSMT.7.B.b.1:** Identify computer-based tools and technology designed to collect and analyze natural resource data.	**AFNR.PSMT.7.B.i.1:** Interpret the types of data available on various geographic information systems (GISs) and other digital resources.	**AFNR.PSMT.7.B.a.1:** Analyze data available on various GIS programs and other digital resources.
AFNR.PSMT.7.C: Demonstrate proper use of natural-resource and environmental-management survey tools.	**AFNR.PSMT.7.C.b.1.a:** Identify land surveying tools and their uses. **AFNR.PSMT.7.C.b.1.b:** Identify water quality surveying tools and what they are used for. **AFNR.PSMT.7.C.b.1.c:** Identify soil surveying tools and what they are used for. **AFNR.PSMT.7.C.b.1.d:** Identify air quality surveying tools and what they are used for. **AFNR.PSMT.7.C.b.1.e:** Identify energy-production measurement tools and what they are used for.	**AFNR.PSMT.7.C.i.1.a:** Demonstrate proper use of land surveying tools. **AFNR.PSMT.7.C.i.1.b:** Demonstrate proper use of water quality surveying tools. **AFNR.PSMT.7.C.i.1.c:** Demonstrate proper use of soil surveying tools. **AFNR.PSMT.7.C.i.1.d:** Demonstrate proper use of air quality surveying tools. **AFNR.PSMT.7.C.i.1.e:** Demonstrate proper use of energy-production measurement tools.	**AFNR.PSMT.7.C.a.1:** Use measurement and surveying tools to analyze the status of management applications.

Standard: AFNR.PSMT.7

Students will apply knowledge of environmental and natural resource competencies to power, structure, and mechanical technology (PSMT) systems.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.PSMT.7.D: Select, install, and maintain a soil irrigation system.	**AFNR.PSMT.7.D.b.1:** Identify components of a soil irrigation system.	**AFNR.PSMT.7.D.i.1:** Demonstrate proper maintenance of soil irrigations systems.	**AFNR.PSMT.7.D.a.1:** Install a soil irrigation systems.

Standard: AFNR.PSMT.8

Students will gain agricultural skills through a power, structure, and mechanical technology (PSMT) systems Supervised Agricultural Experience (SAE) Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	Intermediate (i)	Advanced (a)
AFNR.PSMT.8.A: Evaluate and implement steps and requirements to pursue a career opportunity in an AFNR career pathway.	**AFNR.PSMT.8.A.b.1:** Identify and summarize steps to pursue a career in an AFNR pathway.	**AFNR.PSMT.8.A.i.1:** Create a personal plan outlining goals and steps to obtain a career in an AFNR pathway.	**AFNR.PSMT.8.A.a.1:** Evaluate progress toward AFNR career goals, and identify opportunities for improvement and necessary adjustments to an individual career plan.
	AFNR.PSMT.8.A.b.2: Examine educational, training, and experiential requirements to pursue a career in an AFNR pathway.	**AFNR.PSMT.8.A.i.2:** Analyze a personal skill set, and add to career plan options for attaining required education, training, and experiences to obtain a career in an AFNR pathway.	**AFNR.PSMT.8.A.a.2:** Evaluate, update, and improve a set of personal tools to reflect current skills, experiences, education, and goals, and complete processes needed to pursue and obtain a career in an AFNR pathway.

Standard: AFNR.PSMT.8

Students will gain agricultural skills through a power, structure, and mechanical technology (PSMT) systems Supervised Agricultural Experience (SAE) Program.

Learning Priority	Performance Indicators (By Learning Progression)		
	Beginning (b)	**Intermediate (i)**	**Advanced (a)**
AFNR.PSMT.8.B: Examine and choose career opportunities matched to personal skills, talents, and career goals in an AFNR pathway of interest.	**AFNR.PSMT.8.B.b.1:** Research and describe careers in each of the AFNR pathways, and choose potential careers connecting to personal interests and skills.	**AFNR.PSMT.8.B.i.1:** Assemble and analyze examples of careers and related statistics on local, state, national, and global levels.	**AFNR.PSMT.8.B.a.1:** Conduct interviews with career professionals within the AFNR pathways, and summarize the results.
AFNR.PSMT.8.C: Connect and apply academic learning, knowledge, and technical skills to solve problems through a Supervised Agriculture Experience (SAE).		**AFNR.PSMT.8.C.i.1:** Identify opportunities to apply cross-curricular academic learning and technical skills to an SAE.	**AFNR.PSMT.8.C.a.1:** Practice applying academic knowledge and technical skills in an SAE, and reflect on the results achieved.