

# ***Plant Systems Program of Study and Complementary Course Standards***



This document was prepared by:

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**Draft for Review** by the Nevada State Board of Education on  
**July 26, 2023**

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**Vision**

*All Nevada students are equipped and feel empowered to attain their vision of success*

**Mission**

*To improve student achievement and educator effectiveness by ensuring opportunities, facilitating learning, and promoting excellence*



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## Acknowledgements

The development of Nevada career and technical education (CTE) standards and assessments is a collaborative effort sponsored by the Nevada Department of Education (NDE) Office of Career Readiness, Adult Learning, and Education Options. The Nevada Department of Education relies on educators and industry representatives who have the technical expertise and teaching experience to develop standards and performance indicators that truly measure student skill attainment. More importantly, the NDE would like to recognize the time and commitment by the writing team members in developing the career and technical standards for Plant Systems.

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## Business and Industry Validation

All CTE standards developed through the Nevada Department of Education are validated by business and industry through one or more of the following processes: (1) the standards are developed by a team consisting of business and industry representatives, or (2) a separate review panel is coordinated with industry experts to ensure the standards include the proper content, or (3) nationally recognized standards currently endorsed by business and industry.

The Plant Systems standards were validated through active participation of business and industry representatives on the development team.

## Introduction

The standards in this document are designed to clearly state what the student should know and be able to do upon completion of a high school Plant Systems program of study. These standards are designed for a two-credit course sequence that prepares the student for a technical assessment directly aligned to the standards.

These exit-level standards are designed for the student to complete all standards through their completion of a program of study. These standards are intended to guide curriculum objectives for a program of study.

The standards are organized as follows:

- **Content Standards** are general statements that identify major areas of knowledge, understanding, and the skills students are expected to learn in key subject and career areas by the end of the program.
- **Performance Standards** follow each content standard. Performance standards identify the more specific components of each content standard and define the expected abilities of students within each content standard.
- **Performance Indicators** are very specific criteria statements for determining whether a student meets the performance standard. Performance indicators may also be used as learning outcomes, which teachers can identify as they plan their program learning objectives. The indicators are followed by designations that reflect the course sequence (e.g., 12 for the first-year course of a two-year program and 22 for the second-year course, C is to designate the indicators to be taught in the complementary courses) as referenced in the Core Course Sequence table.

The crosswalks and alignments are located in the Program Supplemental Program Resources document. These will show where the performance indicators support the Nevada Academic Content Standards. For individual course descriptions, please reference the Supplemental Program Resource or the Nevada CTE Catalog.

All students are encouraged to participate in the career and technical student organization (CTSO) that relates to the Plant Systems program. CTSOs are co-curricular national organizations that directly reinforce learning in the CTE classroom through curriculum resources, competitive events, and leadership development. CTSOs provide students the ability to apply academic and technical knowledge, develop communication and teamwork skills, and cultivate leadership skills to ensure college and career readiness.

The Employability Skills for Career Readiness identify the skills needed to be successful in all careers and must be taught as an integrated component of all CTE course sequences. These standards are available in a separate document.

The **Standards Reference Code** is only used to identify or align performance indicators listed in the standards to daily lesson plans, curriculum documents, or national standards. The Standards Reference Code is an abbreviated name for the program, and the content standard, performance standard and performance indicator are referenced in the program standards. This abbreviated code for identifying standards uses each of these items. For example, PLSYS is the Standards Reference Code for Plant Systems. For Content Standard 2, Performance Standard 3 and Performance Indicator 4 the Standards Reference Code would be PLSYS.2.3.4.

## Plant Systems

### Program Information

- Program of Study:** Plant Systems
- Standards Reference Code:** PLSYS
- Career Cluster:** Agriculture, Food, and Natural Resources
- Career Pathway(s):** Plant Systems
- Program Length:** 2-year, completed sequentially
- CTSO:** FFA

### Program Structure Required Program of Study Courses

The core course sequencing is provided in the following table. Complementary Courses are available and provided later in this document. The following courses provide a completed program of study. The Lab is a complementary course available concurrently with the Plant Systems II course.

**Core Course Sequence (R) with Lab Course(s) (C)**

Required/ Complementary	Course Title	Abbreviated Name
R	Principles of Agriculture, Food, and Natural Resources	AG SCIENCE
R	Plant Science	PLANT SCI

**CONTENT STANDARD 1.0: INTEGRATE CAREER AND TECHNICAL STUDENT ORGANIZATIONS (CTSOs)****Performance Standard 1.1: Explore the History and Organization of CTSOs**

- 1.1.1 Discuss the requirements of CTSO participation/involvement as described in Carl D. Perkins Law (12, 22, C)
- 1.1.2 Research nationally recognized CTSOs (12, 22, C)
- 1.1.3 Investigate the impact of federal and state government regarding the progression and operation of CTSOs (e.g., Federal Statutes and Regulations, Nevada Administrative Code [NAC], Nevada Revised Statutes [NRS]) (12, 22, C)

**Performance Standard 1.2: Develop Leadership Skills**

- 1.2.1 Discuss the purpose of parliamentary procedure (12, 22, C)
- 1.2.2 Demonstrate the proper use of parliamentary procedure (12, 22, C)
- 1.2.3 Differentiate between an office and a committee (12, 22, C)
- 1.2.4 Discuss the importance of participation in local, regional, state, and national conferences, events, and competitions (12, 22, C)
- 1.2.5 Participate in local, regional, state, or national conferences, events, or competitions (12, 22, C)
- 1.2.6 Describe the importance of a constitution and bylaws to the operation of a CTSO chapter (12, 22, C)

**Performance Standard 1.3: Participate in Community Service**

- 1.3.1 Explore opportunities in community service-related work-based learning (WBL) (12, 22, C)
- 1.3.2 Participate in a service learning (program related) and/or community service project or activity (12, 22, C)
- 1.3.3 Engage with business and industry partners for community service (12, 22, C)

**Performance Standard 1.4: Develop Professional and Career Skills**

- 1.4.1 Demonstrate college and career readiness (e.g., applications, resumes, interview skills, presentation skills) (12, 22, C)
- 1.4.2 Describe the appropriate professional/workplace attire and its importance (12, 22, C)
- 1.4.3 Investigate industry-standard credentials/certifications available within this Career Cluster™ (12, 22, C)
- 1.4.4 Participate in authentic contextualized instructional activities (12, 22, C)
- 1.4.5 Demonstrate technical skills in various student organization activities/events (12, 22, C)

**Performance Standard 1.5: Understand the Relevance of Career and Technical Education (CTE)**

- 1.5.1 Make a connection between program standards to career pathway(s) (12, 22, C)
- 1.5.2 Explain the importance of participation and completion of a program of study (12, 22, C)
- 1.5.3 Promote community awareness of local student organizations associated with CTE programs (12, 22, C)

**CONTENT STANDARD 2.0: EXAMINE THE ROLE OF AGRICULTURE IN SOCIETY****Performance Standard 2.1: Recognize the Role of Agriculture in Society**

- 2.1.1 Assess how agriculture supports daily life (12)
- 2.1.2 Describe the importance and value of global agricultural trade (12)
- 2.1.3 Describe the various components of the agriculture industry (e.g., value chain) (12)
- 2.1.4 Discuss the role of modern agriculture in basic human needs by identifying products used to provide food, clothing, and shelter (e.g., world food security) (12)
- 2.1.5 Discuss the role of diverse cultures in developing American agriculture practices (12)

**Performance Standard 2.2: Understand the History of Production Agriculture**

- 2.2.1 Compare agriculture's role in developing civilizations (12)
- 2.2.2 Organize the major technological developments that have occurred in agriculture (12)
- 2.2.3 Interpret historical events and trends that have led to the development of today's agriculture industry (12)

**Performance Standard 2.3: Explore the World Food Supply**

- 2.3.1 Analyze the impact of agriculture on the local, state, national, and world economies (12)
- 2.3.2 Explain the role of government in the world's food supply (12)



**CONTENT STANDARD 3.0: DEVELOP LEADERSHIP AND COMMUNICATION SKILLS THROUGH PARTICIPATION IN FFA****Performance Standard 3.1: Understand the History and Organization of FFA**

- 3.1.1 Summarize how, when, and why the National FFA Organization was founded (12)
- 3.1.2 Describe the mission and strategies, colors, motto, parts of the emblem, and organizational structure of the National FFA Organization (12)
- 3.1.3 Recite and explain the meaning of the FFA Creed (12)
- 3.1.4 Explain the purpose of FFA's Program of Activities and describe its committee structure (12)

**Performance Standard 3.2: Understand the Opportunities in FFA**

- 3.2.1 Describe how FFA develops leadership skills, personal growth, and career success (12)
- 3.2.2 Identify major state and national activities and awards available to FFA members (12)
- 3.2.3 Compete in at least one Leadership or Career Development Event at the local level (12)

**Performance Standard 3.3: Properly use Skills in Parliamentary Procedure**

- 3.3.1 List three reasons why parliamentary procedure is used in meetings (12)
- 3.3.2 List five classifications of motions (12)
- 3.3.3 Properly perform ten procedures of parliamentary law (12)

**Performance Standard 3.4: Understand the Importance of School and Community Awareness**

- 3.4.1 Discuss the meaning and importance of community service and some agriculture associated organizations (12)
- 3.4.2 Explain how FFA members can become involved in community improvement and development, and plan an activity (12)

**Performance Standard 3.5: Recognize the Traits of Effective Leaders and Participate in Leadership Training Through Involvement in FFA**

- 3.5.1 Expand leadership experience by serving as a chapter officer or on a committee (22)
- 3.5.2 Participate in a career development event at the local level or above (22)

**Performance Standard 3.6: Understand the Importance of School and Community Awareness**

- 3.6.1 Participate in a school improvement or community development project (22)

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**CONTENT STANDARD 4.0: DEVELOP A SUPERVISED AGRICULTURAL EXPERIENCE (SAE) PROGRAM****Performance Standard 4.1: Understand the Benefits of an SAE Program**

- 4.1.1 Participate in a foundational SAE (12)
- 4.1.2 Explore an immersion SAE (12)
- 4.1.3 Describe the value of SAE programs (12)
- 4.1.4 Compare and contrast the six types of SAEs (12)

**Performance Standard 4.2: Understand the Benefits of SAE Records**

- 4.2.1 Analyze the importance of keeping records of an SAE program (Agricultural Experience Tracker [AET©]) (12)
- 4.2.2 Investigate the types of financial records needed to support a chosen SAE program (12)
- 4.2.3 Demonstrate the procedures for making entries in The AET© (12)
- 4.2.4 Reflect on The AET© Annual Review (12)

**Performance Standard 4.3: Maintain a Supervised Agricultural Experience**

- 4.3.1 Accurately maintain SAE record books (22)
- 4.3.2 Apply for proficiency award related to SAE program area (22)
- 4.3.3 Actively pursue necessary steps to receive higher degrees in FFA (22)

**CONTENT STANDARD 5.0: EXPLORING SCIENTIFIC INVESTIGATION IN AGRICULTURE****Performance Standard 5.1: Design and Conduct Agricultural Research**

- 5.1.1 Explain that agriculture is a science (12)
- 5.1.2 List the steps of the scientific method (12)
- 5.1.3 Explain the steps in conducting research in agriculture and design an appropriate research project (12)

**Performance Standard 5.2: Understand Scientific Measurement**

- 5.2.1 Describe the systems of measurement used in this country (12)
- 5.2.2 Determine the metric prefixes and units used for measuring length, volume weight, temperature, and area (12)
- 5.2.3 Convert from one system of units to another system of units (12)

**Performance Standard 5.3: Use Laboratory Tools and Equipment**

- 5.3.1 Identify and properly use personal protection equipment (PPE) (12)
- 5.3.2 Describe safety in agriscience laboratories (12)
- 5.3.3 Demonstrate proper use of common agriscience equipment (12)

**Performance Standard 5.4: Explore Careers in Agricultural Science**

- 5.4.1 Identify basic career information related to agricultural science (12)
- 5.4.2 Research several agricultural science careers (12)

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**CONTENT STANDARD 6.0: DEVELOP AN UNDERSTANDING OF ANIMAL SCIENCE****Performance Standard 6.1: Understanding Cellular Biology**

- 6.1.1 Explain a cell's role and compare and contrast the types of cells (prokaryotic and eukaryotic) (12)
- 6.1.2 Analyze the components of an animal cell and explain their functions (12)
- 6.1.3 Analyze the components of a plant cell and explain their functions (12)
- 6.1.4 Differentiate between a plant and animal cell (12)

**Performance Standard 6.2: Explore and Evaluate the Livestock Industry**

- 6.2.1 Define terms used to describe beef cattle, dairy, sheep, swine, and horses and identify their external parts (12)
- 6.2.2 Compare and contrast the common breeds of livestock (12)
- 6.2.3 Identify and describe methods used to select different species of livestock (12)
- 6.2.4 Evaluate livestock in a systematic, organized manner according to industry standards (12)

**Performance Standard 6.3: Explore Reproductive Physiology and Breeding Systems**

- 6.3.1 Compare and explain common breeding systems used in livestock production (12)

**Performance Standard 6.4: Understand Animal Nutrition**

- 6.4.1 Identify the major parts and describe the functions of the digestive systems in livestock (12)
- 6.4.2 Explore the major nutrients and their importance to animals (12)

**Performance Standard 6.5: Understand Animal Health Management**

- 6.5.1 Measure animal health through visual and tangible observations (12, 22)
- 6.5.2 Identify good animal health management practices (12, 22)

**Performance Standard 6.6: Explore Careers in Animal Science**

- 6.6.1 Identify basic career information related to animal science (12)
- 6.6.2 Research several animal science careers (12)

**CONTENT STANDARD 7.0: UNDERSTANDING PLANT SCIENCE****Performance Standard 7.1: Understand Plant Anatomy**

- 7.1.1 Identify and describe the parts of a flower (12)
- 7.1.2 Explain the purpose of a flower (12)
- 7.1.3 Identify and describe the parts of a root (12)
- 7.1.4 Explain the purpose of a root (12)
- 7.1.5 Identify and describe the parts of a stem (12)
- 7.1.6 Explain the purpose of a stem (12)
- 7.1.7 Identify and describe the parts of a leaf (12)
- 7.1.8 Explain the purpose of a leaf (12)

**Performance Standard 7.2: Understand Plant Physiology**

- 7.2.1 Describe the process of photosynthesis (12)
- 7.2.2 Describe the process of cellular respiration (12)
- 7.2.3 Explain the relationship between photosynthesis and respiration (12)
- 7.2.4 Summarize why photosynthesis and respiration are important to human beings (12)

**Performance Standard 7.3: Understand Plant Propagation**

- 7.3.1 Explain the importance of plant propagation (12)
- 7.3.2 Explore the basic principles of crop production (food, forage, and fiber) (12)
- 7.3.3 Identify and list the major parts of a seed (12)
- 7.3.4 List the function of each major part of a seed (12)
- 7.3.5 Describe and observe the process of seed germination (12)
- 7.3.6 Describe the process of fertilization and pollination (12)

**Performance Standard 7.4: Understand Plant Nutrition and Health**

- 7.4.1 Differentiate between macronutrients and micronutrients (12)
- 7.4.2 Describe pH and how it is modified (12)
- 7.4.3 Describe the components of a fertilizer (e.g., nitrogen, phosphorus, potassium [NPK]) (12)

**Performance Standard 7.5: Explore Careers in Plant Science**

- 7.5.1 Identify basic career information related to plant science (12)
- 7.5.2 Research several plant science careers (12)

**CONTENT STANDARD 8.0: EXPLORING SOIL SCIENCE**

**Performance Standard 8.1: Understand Soil Texture and Structure**

- 8.1.1 List the components of soil (12)
- 8.1.2 Describe the concept of soil texture and its importance (12)
- 8.1.3 Classify the texture of a soil sample (12)
- 8.1.4 Identify various soil structures, their formation, and importance in agriculture production (12)

**Performance Standard 8.2: Explore Careers in Soil Science**

- 8.2.1 Identify basic career information related to soil science (12)
- 8.2.2 Research several soil science careers (12)

**CONTENT STANDARD 9.0: EXPLORING ORNAMENTAL HORTICULTURE****Performance Standard 9.1: Explore Areas of Ornamental Horticulture**

- 9.1.1 Explore the Basic Principles of Landscape Design (12)
- 9.1.2 Explore the Basic Principles of Greenhouse Management (12)
- 9.1.3 Explore the Basic Principles of Floriculture (12)
- 9.1.4 Explore the Basic Principles of Nursery Crop Production (e.g., gardening, cut flowers) (12)

**Performance Standard 9.2: Explore Careers in Ornamental Horticulture**

- 9.2.1 Identify basic career information related to ornamental horticulture science (12)
- 9.2.2 Research several ornamental horticulture science careers (e.g., landscape, greenhouse management, horticulture) (12)

**CONTENT STANDARD 10.0: EXPLAIN BASIC SALES AND MARKETING CONCEPTS FOR AGRICULTURAL PRODUCTS****Performance Standard 10.1: Demonstrate an Understanding of Agricultural Marketing**

- 10.1.1 Identify current agriculture product marketing trends (12)
- 10.1.2 Compare and contrast marketing and sales (12)
- 10.1.3 Define the purpose for developing a marketing plan (12)

**Performance Standard 10.2: Understand the Principles of Agricultural Sales**

- 10.2.1 Identify the characteristics of an effective salesperson, and define related terms (12)
- 10.2.2 Compare and contrast the relationship between marketing and selling (12)
- 10.2.3 Describe the customer buying process (12)
- 10.2.4 Identify the six steps involved in the selling process (12)

**Performance Standard 10.3: Explore Careers in Sales and Marketing**

- 10.3.1 Identify basic career information related to sales and marketing (12)
- 10.3.2 Research several sales and marketing careers (12)



**CONTENT STANDARD 11.0: UNDERSTAND THE RELATIONSHIP BETWEEN AGRICULTURE AND NATURAL RESOURCE MANAGEMENT****Performance Standard 11.1: Explore Types of Natural Resources**

- 11.1.1 Define and identify types of natural resources (12)
- 11.1.2 Distinguish between renewable and nonrenewable resources (12)
- 11.1.3 Compare the difference between inexhaustible and exhaustible resources (12)

**Performance Standard 11.2: Understand Human Demand on Natural Resources**

- 11.2.1 Recognize how humans use natural resources (12)
- 11.2.2 Identify the urban and rural impacts of natural resource use (12)
- 11.2.3 Analyze the impact of recycling and reusing resources (12)

**Performance Standard 11.3: Comprehend Natural Resource Conservation**

- 11.3.1 Compare and contrast conservation and preservation (12)

**Performance Standard 11.4: Understand Ecology and Ecosystems**

- 11.4.1 Define ecology and ecosystems (12)
- 11.4.2 Explain natural selection and succession (12)
- 11.4.3 Identify biomes and explain ecosystem diversity (12)
- 11.4.4 Diagram and explain the nitrogen, phosphorus, carbon, and water cycle (12)

**Performance Standard 11.5: Explore Principles of Rangeland Management**

- 11.5.1 Define range (12)
- 11.5.2 Define multiple use (12)
- 11.5.3 Identify Nevada's ecoregions (Sierra Nevada, Northern Basin and Range, Central Basin and Range, and Mojave Basin and Range) (12)

**Performance Standard 11.6: Explore Careers in Natural Resource Management**

- 11.6.1 Identify basic career information related to natural resource management (12)
- 11.6.2 Research several natural resource management careers (12)

**CONTENT STANDARD 12.0: PRACTICE SAFETY IN THE ORNAMENTAL HORTICULTURE AND GREENHOUSE INDUSTRY**

**Performance Standard 12.1: Properly Perform Safe Work Practices**

- 12.1.1 Identify and properly use personal protective equipment
- 12.1.2 Read, understand, and follow label directions and Safety Data Sheets (SDS)
- 12.1.3 Properly identify common hand tools and power equipment
- 12.1.4 Safely use common hand tools and power equipment
- 12.1.5 Complete worker protection handler verification card training
- 12.1.6 Complete produce handling safety training

**CONTENT STANDARD 13.0: UNDERSTANDING PLANT ANATOMY****Performance Standard 13.1: Understand Root Anatomy**

- 13.1.1 Investigate the functions of roots in plants
- 13.1.2 Identify the parts of a root
- 13.1.3 Differentiate the two major types of root systems
- 13.1.4 Investigate specialized structures in roots (e.g., root tips)

**Performance Standard 13.2: Understand Stem Anatomy**

- 13.2.1 List the functions of a stem
- 13.2.2 Recognize the external structures of a stem
- 13.2.3 Analyze the internal structures of a stem
- 13.2.4 Describe the difference between cell structures in monocots and dicots
- 13.2.5 Investigate specialized structures in stems

**Performance Standard 13.3: Understand Leaf Anatomy**

- 13.3.1 Name the main parts of a leaf
- 13.3.2 Compare common vein patterns found in leaves
- 13.3.3 List three functions of a leaf, including photosynthetic energy conversion
- 13.3.4 Differentiate major leaf arrangements
- 13.3.5 Investigate specialized cell structures in a leaf

**Performance Standard 13.4: Understand Flower Anatomy**

- 13.4.1 Label and describe the parts of a flower
- 13.4.2 Summarize the purpose of a flower
- 13.4.3 Distinguish between different types of flowers
- 13.4.4 Describe the difference between monocot and dicot flowers
- 13.4.5 Diagram the process of plant fertilization

**CONTENT STANDARD 14.0: UNDERSTANDING PLANT PHYSIOLOGY****Performance Standard 14.1: Examine Energy Conversion in Plants**

- 14.1.1 Interpret the process of photosynthesis
- 14.1.2 Interpret the process of cellular respiration
- 14.1.3 Compare the process of cellular respiration to photosynthesis

**Performance Standard 14.2: Examine Transport Within a Plant System**

- 14.2.1 Compare the active and passive transport of minerals into the root system and throughout the plant system
- 14.2.2 Compare the structure and function of xylem and phloem cells and tissues
- 14.2.3 Describe the process of translocation

**Performance Standard 14.3: Examine Environmental Requirements for Plant Growth**

- 14.3.1 Examine the effects of light quality on plant growth (e.g., spectrum, foot candles)
- 14.3.2 Examine the effects of water quality on plant growth (e.g., pH, hardness)
- 14.3.3 Examine the effects of temperature on plant growth

**Performance Standard 14.4: Research Plant Growth Regulators**

- 14.4.1 Compare the functions of plant hormones
- 14.4.2 Examine commercial uses for plant growth regulators

**Performance Standard 14.5: Explore Plant Tropisms**

- 14.5.1 Investigate plant tropisms (e.g., gravi-, hydro-, photo-, thigmo-)

**CONTENT STANDARD 15.0: USE PLANT IDENTIFICATION SKILLS****Performance Standard 15.1: Categorize Plants**

- 15.1.1 Correctly categorize common plants by life cycle (e.g., annuals, perennials, etc.)
- 15.1.2 Correctly categorize plants by growth habits (e.g., mounding, trailing, etc.)
- 15.1.3 Utilize resources to establish plant suitability for a selected site (i.e., Hardiness Zone Maps, Heat Zone Maps)
- 15.1.4 Identify common plants by botanical and common names
- 15.1.5 Explore the structural differences between monocot and dicot plants

**CONTENT STANDARD 16.0: EXPLORE GROWING MEDIA****Performance Standard 16.1: Understand Soil Texture and Structure**

- 16.1.1 List the components of soil
- 16.1.2 Describe the concept of soil texture and its importance
- 16.1.3 Classify the texture of a soil sample (e.g., texture triangle)
- 16.1.4 Identify various soil structures, their formation, and importance in agriculture production

**Performance Standard 16.2: Explore Soilless Growing Media**

- 16.2.1 Identify the components and source of soilless growing media
- 16.2.2 Describe the functions of growing media
- 16.2.3 Determine desirable properties of growing media (e.g., drainage, organic matter, micro-organisms, water holding capacity and permeability)
- 16.2.4 Evaluate the advantages and disadvantages of soilless media

**Performance Standard 16.3: Explore Chemical Characteristics of Growing Media**

- 16.3.1 Test and determine pH level of various growing media
- 16.3.2 Interpret pH test results of a growing media sample
- 16.3.3 Test and determine the electrical conductivity of various growing media
- 16.3.4 Interpret electrical conductivity test results of a growing media sample
- 16.3.5 Interpret soil test results and make recommendation(s)

**CONTENT STANDARD 17.0: EXPLORE PLANT NUTRITION****Performance Standard 17.1: Explore Fertilizer Formulation**

- 17.1.1 Identify the components of a fertilizer and their role in the biochemical cycle
- 17.1.2 Interpret a fertilizer label
- 17.1.3 Categorize methods of application (e.g., granular, time released, injector, foliar)
- 17.1.4 Develop a fertilizer management plan for a greenhouse crop
- 17.1.5 Discuss the importance of minerals to plant nutrition (e.g., cation exchange)

**Performance Standard 17.2: Explore the Function of Plant Nutrients**

- 17.2.1 Correlate plant symptoms to the appropriate nutritional deficiency (e.g., nitrogen deficiency, yellowing leaves)
- 17.2.2 Correlate plant symptoms to the appropriate plant toxicity (e.g., fertilizer burn, leaf tip burn)

**CONTENT STANDARD 18.0: EXPLORE INTEGRATED PEST MANAGEMENT (IPM)****Performance Standard 18.1: Describe Integrated Pest Management**

- 18.1.1 Define Integrated Pest Management (IPM)
- 18.1.2 Summarize the benefits of IPM

**Performance Standard 18.2: Explore Common Pests and Diseases**

- 18.2.1 Identify types of plant pests and diseases
- 18.2.2 Identify weed, insect, rodent, and fungi pests
- 18.2.3 Differentiate between infectious and noninfectious diseases
- 18.2.4 Design an ongoing plan for pest management and prevention

**Performance Standard 18.3: Explain Procedures for the Safe Handling, Use, and Storage of Pesticides**

- 18.3.1 Identify and utilize appropriate safety measures when applying pesticides
- 18.3.2 Interpret pesticide labels
- 18.3.3 Explain procedures for storing and disposing of pesticides
- 18.3.4 Evaluate environmental and consumer concerns regarding pest management and biodiversity
- 18.3.5 Create a formulation for a pesticide mixture based on label directions
- 18.3.6 Explore requirements for obtaining pesticide applicator licenses



**CONTENT STANDARD 19.0: DEMONSTRATE PLANT PROPAGATION****Performance Standard 19.1: Understand Propagation by Seed**

- 19.1.1 Diagram the process of seed germination
- 19.1.2 Identify the conditions needed for seed germination
- 19.1.3 Compare the methods of seed preparation
- 19.1.4 Demonstrate techniques for sowing seeds
- 19.1.5 Determine germination percent

**Performance Standard 19.2: Understand Asexual Propagation**

- 19.2.1 Summarize optimum conditions for asexual propagation
- 19.2.2 Demonstrate or model techniques used to propagate plants by cutting
- 19.2.3 Demonstrate or model techniques used to propagate plants by division
- 19.2.4 Demonstrate or model techniques used to propagate plants by separation
- 19.2.5 Demonstrate or model techniques used to propagate plants by layering

**CONTENT STANDARD 20.0: GROWING GREENHOUSE CROPS****Performance Standard 20.1: Prepare for Crop Production**

- 20.1.1 Plan a growing schedule to maximize the production of a greenhouse facility
- 20.1.2 Utilize best management practices when spacing greenhouse crops in practice or through modeling
- 20.1.3 Select appropriate containers and medium for a greenhouse crop

**Performance Standard 20.2: Perform Growth Maintenance Procedures**

- 20.2.1 Compare and contrast hard and soft pinches while using best management practices
- 20.2.2 Pinch plants using best management practices
- 20.2.3 Demonstrate proper watering techniques
- 20.2.4 Develop a plant lighting schedule for a greenhouse crop
- 20.2.5 Develop a fertilizer schedule for a greenhouse crop

**Performance Standard 20.3: Perform Transplanting**

- 20.3.1 Identify the proper stage of plant growth for transplanting
- 20.3.2 Select appropriate plants for transplanting
- 20.3.3 Demonstrate transplanting procedures to industry standards

**Performance Standard 20.4: Prepare Plants for Sale**

- 20.4.1 Compare hardening processes
- 20.4.2 Prepare plants for sale using best management practices

**CONTENT STANDARD 21.0: EXPLORE GREENHOUSE BUSINESS CONCEPTS****Performance Standard 21.1: Explain the Basics of Marketing in the Greenhouse Industry**

- 21.1.1 Compare and contrast advertising methods
- 21.1.2 Define the purpose for developing a marketing plan
- 21.1.3 Create a horticulture business display to a target market

**Performance Standard 21.2: Understand the Principles of Sales**

- 21.2.1 Compare and contrast the relationship between marketing and selling
- 21.2.2 Calculate markup
- 21.2.3 Complete a sales ticket

**CONTENT STANDARD 22.0: EXPLORING PLANT TECHNOLOGIES****Performance Standard 22.1: Explore Selective Plant Breeding**

- 22.1.1 Describe the selective plant breeding process
- 22.1.2 Explain how to estimate the heritability of certain traits
- 22.1.3 Predict the genotypes and phenotypes from monohybrid and dihybrid crosses using a Punnett Square
- 22.1.4 Describe sex determination, linkage, crossover, and mutation

**Performance Standard 22.2: Examine Genetic Engineering of Plants**

- 22.2.1 Explain the advantages and disadvantages for genetic manipulation of plants
- 22.2.2 Investigate transgenic plants on the market (e.g., hybrids, genetically modified organisms)

**Performance Standard 22.3: Describe Micropropagation Techniques**

- 22.3.1 Define micropropagation and its importance
- 22.3.2 Explain applications of micropropagation
- 22.3.3 Describe procedures used in micropropagation

**Performance Standard 22.4: Explore Hydroponic Techniques**

- 22.4.1 Define hydroponics and its importance to society
- 22.4.2 Explain applications of hydroponics and determine costs and benefits
- 22.4.3 Describe procedures used in hydroponic plant production
- 22.4.4 Design and implement a hydroponic system
- 22.4.5 Analyze the efficiency of implemented hydroponic system designs

**CONTENT STANDARD 23.0: EXPLORE CAREER OPPORTUNITIES IN HORTICULTURE AND PLANT SCIENCE****Performance Standard 23.1: Explore Careers in Horticulture and Plant Science**

- 23.1.1 Research potential careers in horticulture and plant science
- 23.1.2 Prepare a list of employability skills for a career in the horticulture and plant science industries
- 23.1.3 Explore training and educational opportunities in horticulture and plant science industries
- 23.1.4 Research additional industry certifications available

## Complementary Courses

### State Complementary Skill Standards

State complementary skill standards are designed to clearly state what the student should know and be able to do upon completion of a **one-year** complementary course related to their career and technical education (CTE) program of study. **Completion of the qualifying Program of Study is required prior to enrollment in a complementary course.**

### Employability Skills for Career Readiness Standards

Students have completed all program content standards and will pursue advanced study through investigation and in-depth research.

### Complementary Course Standards Contributing Members

Course Contribution(s)	Name	Occupation/Title	Stakeholder Affiliation	School/Organization
Agricultural Business	Tyler Heaton	Instructor	Secondary Educator	Lincoln County High School, Nye County School District
Agricultural Business	Rosealee Rieman	Instructor	Secondary Educator	Smith Valley High School, Lyon County School District
Agricultural Business	Blane Merkley	County Executive Director	Business and Industry Representative	USDA Farm Productions and Conservation, Las Vegas and Ely
Agricultural Leadership, Communication, and Policy	Heather Dye	Instructor	Postsecondary Educator	University of Nevada, Reno
Agricultural Leadership, Communication, and Policy	Melissa Jones	Instructor	Secondary Educator	Pershing County High School, Pershing County School District
Agricultural Leadership, Communication, and Policy	Ryan Carpenter	Instructor	Secondary Educator	Owyhee Combined School, Elko County School District
Agricultural Leadership, Communication, and Policy	Melissa Jones	Instructor	Secondary Educator	Pershing County High School, Pershing County School District
Environmental Natural Resources / Food Science Technology	Don Noorda	Instructor	Secondary Educator	Wells High School, Elko County School District
Environmental Natural Resources	Ryan Kyndall	Instructor	Secondary Educator	Wells High School, Elko County School Districts
Environmental Natural Resources	David Voth	Ranch Business Manager	Business and Industry Representative	Nevada Gold Mines, Elko
Food Science Technology	Ty Smith	Instructor	Secondary Educator	Spring Creek High School, Spring Creek
Food Science Technology	Martin Potnick	Project Manager	Business and Industry Representative	Nevada Industry Excellence
Greenhouse and Landscape Management	David Prosser	Owner/Operator	Business and Industry Representative	Desert Star Landscaping, Gardnerville
Greenhouse and Landscape Management	Jessica Butz	Instructor	Secondary Educator	Elko High School, Elko County School District
Greenhouse and Landscape Management	Sherri Lenz	Instructor	Secondary Educator	North Valleys High School, Washoe County School District
Greenhouse and Landscape Management	Jenifer Sexson	Instructor	Secondary Educator	Yerington High School, Lyon County School District

### **Business and Industry Validation**

All CTE standards developed through the Nevada Department of Education are validated by business and industry through one or more of the following processes: (1) the standards are developed by a team consisting of business and industry representatives, or (2) a separate review panel is coordinated with industry experts to ensure the standards include the proper content, or (3) nationally recognized standards currently endorsed by business and industry.

The Agricultural Business, Agricultural Leadership, Communication, and Policy, Environmental and Natural Resources, Food Science Technology, and Greenhouse and Landscape Management complementary standards for the Plant Systems program of study were validated through active participation of business and industry representatives on the development team.

## Complementary Course Information for Plant Systems

### Program Information

**Qualifying Program of Study:** Plant Systems

**Career Cluster:** Agriculture, Food, and Natural Resources

**Career Pathway(s):** Plant Systems

**CTSO:** FFA

**Grade Level:** 11-12

### Program Structure for Complementary Courses

The complementary courses are provided in the following table. **The qualifying program of study must be completed prior to enrolling in the complementary courses** (except labs that are done concurrently with the second-year course). A program does not have to utilize the complementary courses for students to complete their program of study.

#### Complementary Courses

Required/ Complementary	Course Title	Abbreviated Name
C	Agricultural Business Systems for Plant Systems	AG BUS PL
C	Agricultural Leadership, Communication and Policy for Plant Systems	AG LCP PL
C	Environmental and Natural Resources for Plant Systems	ENR MGMT PL
C	Food Science Technology for Plant Systems	FOOD SCI TECH PL
C	Greenhouse and Landscape Management	GHOUSE LSCAPE MGMT
C	Plant Science Advanced Studies	PLANT SCI AS
C	Industry-Recognized Credential –Plant Systems	IRC PLANT SYS
C	CTE Work Experience – Agriculture, Food and Natural Resources	WORK EXPER AFNR



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## Complementary Course Standards Agricultural Business Systems

### CONTENT STANDARD 1.0: EXPLORE AGRICULTURE ECONOMIC PRINCIPLES

#### Performance Standard 1.1: Describe Basic Economic Factors that Affect Agricultural Business Management Decisions

- 1.1.1 Analyze how supply and demand affects price
- 1.1.2 Define elasticity as related to supply and demand (Degree to which demand responds to changes in economic factors)
- 1.1.3 Compare factors that shift the supply and demand curve
- 1.1.4 Distinguish the differences between a laissez-faire market and a subsidized market
- 1.1.5 Apply the concept of utility to agricultural commodities (Benefit derived from consumption or use of a commodity)
- 1.1.6 Evaluate the pros and cons of the economies of scale
- 1.1.7 Analyze factors that influence price cycles

#### Performance Standard 1.2: Describe Basic Economic Principles as They Relate to an Agricultural Enterprise

- 1.2.1 Compare and contrast economic systems, including capitalism and socialism
- 1.2.2 Compare and contrast complementary, competitive, and substitute products
- 1.2.3 Predict price changes using the principles of competition and substitution
- 1.2.4 Differentiate between diversification and specialization
- 1.2.5 Explain opportunity costs for an enterprise

#### Performance Standard 1.3: Use Economic Decision-Making Tools to Increase Profitability of an Agricultural Enterprise

- 1.3.1 Distinguish between fixed and variable cost
- 1.3.2 Summarize break-even costs
- 1.3.3 Distinguish between marginal cost and marginal revenue
- 1.3.4 Describe the four factors of production (land, labor, capital, and management)
- 1.3.5 Summarize the three stages of production
- 1.3.6 Describe the law of diminishing returns and how it relates to costs, production, and return on investments

### CONTENT STANDARD 2.0: EXPLORE FINANCIAL CONCEPTS IN AGRICULTURAL BUSINESS

#### Performance Standard 2.1: Use Accounting Fundamentals for Fiscal Management

- 2.1.1 Compare and contrast cash and accrual basis accounting systems
- 2.1.2 Determine current versus non-current liabilities and assets
- 2.1.3 Determine the proper depreciation method for assets
- 2.1.4 Identify fixed and variable costs for an enterprise
- 2.1.5 Identify and apply financial ratios, including solvency, liquidity, and profitability

**Performance Standard 2.2: Analyzing Financial Statements**

- 2.2.1 Differentiate between balance sheets, income statements, and cash flow statements
- 2.2.2 Create a balance sheet for an agricultural enterprise
- 2.2.3 Create an income statement for an agricultural enterprise
- 2.2.4 Create a cash flow statement for an agricultural enterprise
- 2.2.5 Determine how balance sheet, income statement, and cash flow statement relate to each other

**Performance Standard 2.3: Create and Analyze Agricultural Budgets**

- 2.4.1 Describe the purpose and importance of tax planning
- 2.4.2 Discuss how different business ownership types are taxed
- 2.4.3 Distinguish between deductible and non-deductible expenses
- 2.4.4 Explore different depreciation methods affect on tax liability
- 2.4.5 Identify correct sales tax on an agricultural enterprise

**CONTENT STANDARD 3.0: UNDERSTAND RISK MANAGEMENT IN AGRICULTURE BUSINESS****Performance Standard 3.1: Discuss Methods of Financial Risk Management**

- 3.1.1 Define risk management in agricultural enterprises
- 3.1.2 Identify and define factors that influence the time value of money
- 3.1.3 Differentiate between operating and long-term loans
- 3.1.4 Discuss factors that affect the cost of credit
- 3.1.5 Calculate interest expense for an amortized loan
- 3.1.6 Explain how the use of collateral can aid in securing credit
- 3.1.7 Investigate available insurances that help reduce risk (life, property, crop, health, and liability)
- 3.1.8 Discuss available government programs to reduce financial risk
- 3.1.9 Explain how insurance can reduce financial risk
- 3.1.10 Compare and contrast leasing and purchasing real property
- 3.1.11 Compare and contrast leasing and purchasing equipment
- 3.1.12 Explore the financial equity of water rights, property, and improvements

**Performance Standard 3.2: Discuss the Role of Marketing in Risk Management**

- 3.2.1 Explain the futures market (options (i.e., calls, puts, etc.))
- 3.2.2 Research the role of futures in marketing decisions
- 3.2.3 Discuss how cash markets can influence risk management decisions
- 3.2.4 Discuss how forward contracting can reduce risk
- 3.2.5 Examine the influence of domestic and international trade in regards to financial risk

**Performance Standard 3.3: Investigate Legal Risk Management**

- 3.3.1 Compare and contrast the legal risks involved in sole proprietorships, partnerships, and corporations
- 3.3.2 Create a contract agreement for an agricultural enterprise
- 3.3.3 Explain how estate planning can reduce financial risk
- 3.3.4 Identify how local, state, and federal regulations affect agriculture business operations and planning

**CONTENT STANDARD 4.0: EXPLORE BUSINESS PLANNING AND HUMAN RESOURCES****Performance Standard 4.1: Explore Entrepreneurship Opportunities**

- 4.1.1 Evaluate the characteristics of a successful entrepreneur
- 4.1.2 Identify the costs and benefits of entrepreneurship
- 4.1.3 Research venture start-up requirements and risks
- 4.1.4 Assess trends and opportunities for business ventures and generate venture ideas

**Performance Standard 4.2: Explore Business Structures**

- 4.2.1 Identify liability, risks, tax structure, and ownership of sole proprietorships, partnerships, and corporations
- 4.2.2 Understand the advantages and disadvantages of a sole proprietorships
- 4.2.3 Understand the advantages and disadvantages partnerships (ltd, llc, etc)
- 4.2.4 Understand the advantages and disadvantages corporations (s-corp, c-corp)

**Performance Standard 4.3: Design a Business Plan**

- 4.3.1 Identify resources useful for business plan development
- 4.3.2 Develop a plan including time investment, financial investment and capital investment needs
- 4.3.3 Evaluate the learning and financial outcomes of the plan
- 4.3.4 Estimate the return on investment (ROI)

**CONTENT STANDARD 5.0: PREPARING AGRICULTURE MARKETING PLANS****Performance Standard 5.1: Investigate the Marketing Process**

- 5.1.1 Analyze Maslow's Hierarchy of Needs
- 5.1.2 Investigate value-added concepts of marketing
- 5.1.3 Discuss current industry trends in agriculture marketing
- 5.1.4 Differentiate between marketing and sales

**Performance Standard 5.2: Perform a Market Analysis**

- 5.2.1 Establish a buyer profile utilizing behavior analysis
- 5.2.2 Conduct a strength, weakness, opportunities, and threats (SWOT) analysis
- 5.2.3 Determine a product/client's status in current market
- 5.2.4 Differentiate between primary and secondary research methods
- 5.2.5 Conduct a primary research project for a product/client (survey, focus group, interview)

**Performance Standard 5.3: Develop a Business Proposition**

- 5.3.1 Develop a mission statement for an agricultural enterprise or product
- 5.3.2 Determine planning assumptions based on market analysis
- 5.3.3 Differentiate between short and long term goals
- 5.3.4 Create SMART (specific, measurable, attainable, realistic, timely) goals for an agricultural enterprise or product
- 5.3.5 Research potential target markets for an agricultural enterprise or product

**Performance Standard 5.4: Investigate Marketing Strategies and Action Plans**

- 5.4.1 Define positioning in regard to marketing a product to a potential client
- 5.4.2 Describe the importance of the four “P”s (product, price, place, promotion) in marketing
- 5.4.3 Create a positioning statement for an agriculture product/client
- 5.4.4 Differentiate between seasonal pricing, direct pricing, introductory pricing, and bulk pricing
- 5.4.5 Evaluate different distribution channels
- 5.4.6 Identify effective promotional tools for a product/client
- 5.4.7 Calculate the financial return of a marketing plan

**Performance Standard 5.5: Create Marketing Plan Evaluations**

- 5.5.1 Discuss the importance of evaluating a marketing plan
- 5.5.2 Establish benchmarks to track progress
- 5.5.3 Research strategies to measure benchmarks of established goals
- 5.5.4 Create a contingency plan if goals are not being met

**CONTENT STANDARD 6.0: INVESTIGATE AGRICULTURE SALES STRATEGIES****Performance Standard 6.1: Understand the Traits of Quality Salespeople**

- 6.1.1 Describe customer-oriented selling
- 6.1.2 Identify personality traits of a good salesperson
- 6.1.3 Differentiate between employer and customer expectations of salespeople

**Performance Standard 6.2: Investigate the Buying and Selling Process**

- 6.2.1 Differentiate between customer wants and customer needs
- 6.2.2 Analyze the importance of the stages in the customer’s buying process
- 6.2.3 Classify the types of customers according to their buying habits

**Performance Standard 6.3: Investigate the Steps in the Pre-Approach Process**

- 6.3.1 Describe what motivates a customer to buy
- 6.3.2 Discuss the value of accurate product information
- 6.3.3 Identify sources of product information
- 6.3.4 Present product information to a potential buyer

**Performance Standard 6.4: Perform a Sales Presentation**

- 6.4.1 Demonstrate an appropriate customer approach
- 6.4.2 Effectively establish customer rapport
- 6.4.3 Demonstrate effective questioning and answering techniques, including active listening
- 6.4.4 Identify customer wants and needs
- 6.4.5 Apply product features/benefits to customer wants and needs
- 6.4.6 Attempt a trial close
- 6.4.7 Identify and formulate solutions to customer objections
- 6.4.8 Demonstrate effective closing strategies, including suggestion selling
- 6.4.9 Demonstrate appropriate reassurances following a sale

**Performance Standard 6.5: Explore Customer Relations in Agricultural Sales**

- 6.5.1 Discuss the importance of customer relations
- 6.5.2 Discuss the importance of closing a sale
- 6.5.3 Compare follow up strategies that ensure customer satisfaction after a sale
- 6.5.4 Demonstrate appropriate methods for handling customer complaints

**CONTENT STANDARD 7.0: EMPLOYMENT OPPORTUNITIES AND HUMAN RESOURCE MANAGEMENT****Performance Standard 7.1: Explore Career Opportunities in the Agricultural Business Systems**

- 7.1.1 List and describe the types of employment opportunities in agricultural business systems
- 7.1.2 List and describe the types of employment opportunities in agricultural marketing and sales
- 7.1.3 Explore education and training for agriculture careers in sales, marketing, and business management

**Performance Standard 7.2: Managing Human Resources**

- 7.2.1 Critique employment resumés
- 7.2.2 Compare job motivation strategies including skill variety, task identity, task significance, autonomy, and feedback
- 7.2.3 Describe the characteristics of a good manager
- 7.2.4 Explain management's role in agriculture safety
- 7.2.5 Explore laws affecting human resource management
- 7.2.6 Practice interviewing job applicants
- 7.2.7 Role play resolution of employee complaints and grievances
- 7.2.8 Explain the role of policies/procedures to protect the privacy of human resources information
- 7.2.9 Explain state and federal labor laws and regulations for hiring
- 7.2.10 Explain state and federal labor laws and regulations for terminating an employee

**CONTENT STANDARD 8.0: PARTICIPATE IN LEADERSHIP TRAINING THROUGH MEMBERSHIP IN FFA****Performance Standard 8.1: Recognize the Traits of Effective Leaders and Participate in Leadership Training Through Involvement in FFA**

- 8.1.1 Expand leadership experience by serving as a chapter officer or on a committee
- 8.1.2 Participate in a career development event at the local level or above
- 8.1.3 Exhibit leadership skills by demonstrating proper parliamentary procedure

**Performance Standard 8.2: Understand the Importance of School and Community Awareness**

- 8.2.1 Participate in a school improvement or community development project

**CONTENT STANDARD 9.0: DESCRIBE THE RELATIONSHIP BETWEEN A SUPERVISED AGRICULTURAL EXPERIENCE (SAE) AND PREPARATION OF STUDENTS FOR A CAREER IN AGRICULTURE****Performance Standard 9.1: Maintain a Supervised Agricultural Experience**

- 9.1.1 Accurately maintain SAE record books
- 9.1.2 Investigate the proficiency award areas related to SAE program area
- 9.1.3 Research organizations that support your SAE
- 9.1.4 Actively pursue necessary steps to receive higher degrees in FFA

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## Complementary Course Standards Agricultural Leadership, Communication and Policy

### CONTENT STANDARD 1.0: EXAMINE PERSONAL LEADERSHIP DEVELOPMENT IN AGRICULTURE STUDENTS

#### Performance Standard 1.1: Analyze Definitions of Leadership

- 1.1.1 Compare democratic, authoritarian, and laissez-faire behavioral leadership styles
- 1.1.2 Compare and contrast behavioral, situational, and traditional leadership styles
- 1.1.3 Analyze appropriate leadership styles based on group situations

#### Performance Standard 1.2: Identify the Qualities of a Leader

- 1.2.1 Compare and contrast human relation skills (e.g., integrity, loyalty, etc.)
- 1.2.2 Differentiate between technical-human relations skills (e.g., listening, mentoring, team building, etc.)
- 1.2.3 Compare and contrast technical skills (e.g., communication, time management, etc.)
- 1.2.4 Compare and contrast conceptual technical skills (i.e., problem-solving, delegation, and accountability)
- 1.2.5 Compare and contrast conceptual skills (i.e., vision, follow-through, and ability to motivate)

#### Performance Standard 1.3: Develop a Personal Plan for Becoming a Leader

- 1.3.1 Explain the reasons for having a personal leadership development plan
- 1.3.2 Analyze a self-evaluation of your leadership qualities
- 1.3.3 Create a personal mission statement
- 1.3.4 Create personal short-term goals using goals (SMART)
- 1.3.5 Create personal long-term goals using goals (SMART)
- 1.3.6 Identify resources for continued growth (i.e., mentors, organizations, and events)
- 1.3.7 Develop a personal action plan including interviewing a local leader

### CONTENT STANDARD 2.0: DEVELOP GROUP LEADERSHIP SKILLS IN AGRICULTURE EDUCATION

#### Performance Standard 2.1: Explore Roles Within a Group

- 2.1.1 Differentiate between the role of a board and/or committee member, a board and/or committee chair, and an organization officer
- 2.1.2 Identify the duties of chapter or organizational officers
- 2.1.3 Create appropriate meeting documentations (e.g., agenda, minutes, committee reports, roster, etc.)

**Performance Standard 2.2: Explore Group Dynamics**

- 2.2.1 Identify the stages of group development (i.e., forming, storming, norming, performing, and adjourning)
- 2.2.2 Differentiate between conflict management and consensus building
- 2.2.3 Develop and demonstrate active listening skills
- 2.2.4 Identify strategies to bridge diversity within a group
- 2.2.5 Evaluate personal contributions of individuals to team dynamics
- 2.2.6 Demonstrate appropriate etiquette and professionalism in group settings
- 2.2.7 Plan and execute a group event using the four steps of event planning: research, planning, implementation, and evaluation

**Performance Standard 2.3: Utilize Parliamentary Procedure**

- 2.3.1 Identify the importance of organizational bylaws/constitutions used within agriculture organizations
- 2.3.2 Summarize the purposes of parliamentary procedure
- 2.3.3 Describe the proper use of the gavel
- 2.3.4 Outline a formal debate
- 2.3.5 Demonstrate the ability to present motions
- 2.3.6 Demonstrate parliamentary procedure in a meeting-like setting

**CONTENT STANDARD 3.0: UNDERSTAND RESEARCH METHODOLOGY****Performance Standard 3.1: Determine Source Credibility**

- 3.1.1 Critique various sources of data for credibility
- 3.1.2 Identify peer-reviewed research

**Performance Standard 3.2: Identify Academic Integrity**

- 3.2.1 Define plagiarism and consequences of plagiarism
- 3.2.2 Identify sources that identify plagiarism
- 3.2.3 Practice proper citation techniques

**Performance Standard 3.3: Practice Personal Interviewing Techniques**

- 3.3.1 Research background information on the interview subject
- 3.3.2 Acquire background information on a person to be interviewed
- 3.3.3 Differentiate between different question types (i.e., open and closed type)
- 3.3.4 Create a list of interview questions based on research
- 3.3.5 Conduct an interview of a person involved in the agriculture and/or a local industry



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**CONTENT STANDARD 4.0: EXPLORE COMMUNICATION SKILLS****Performance Standard 4.1: Identify Basic Communication Skills**

- 4.1.1 Describe the purposes of communication in agriculture
- 4.1.2 Create a message appropriate to a specific audience
- 4.1.3 Explain various styles of agriculture communication (i.e., persuasive, demonstrative, and informative)
- 4.1.4 Organize a presentation using proper speech/workshop outline format like the “Magic Formula” as found on ffa.org

**Performance Standard 4.2: Explore Non-Verbal Communication Skills**

- 4.2.1 Identify distractive mannerisms when speaking
- 4.2.2 Identify methods of displaying confidence when speaking
- 4.2.3 Recognize non-verbal audience cues
- 4.2.4 Investigate use of gestures to emphasize talking points

**Performance Standard 4.3: Practice Verbal Communication Skills**

- 4.3.1 Differentiate between pronunciation and enunciation
- 4.3.2 Compare and contrast pitch, pace, volume, and tone
- 4.3.3 Create a clear and concise message
- 4.3.4 Demonstrate respect and interest while listening to a presentation

**Performance Standard 4.4: Demonstrate Verbal Communication Techniques**

- 4.4.1 Prepare and present a speech along APA guidelines on agricultural issues
- 4.4.2 Deliver an extemporaneous speech
- 4.4.3 Demonstrate proper telephone etiquette in a professional setting

**Performance Standard 4.5: Demonstrate Written Communication Techniques**

- 4.5.1 Select the appropriate form of technical and business writing or communication for the specific situation (i.e., email, memos, business letters, and thank you cards)
- 4.5.2 Explain the benefits of quality group correspondence (i.e., social media and newsletters)
- 4.5.3 Demonstrate appropriate correspondence etiquette

**CONTENT STANDARD 5.0: EXAMINE AGRICULTURE JOURNALISM****Performance Standard 5.1: Explore News Writing Procedures**

- 5.1.1 Apply the five ‘W’s and H Technique” of journalistic writing – who, what, when, why, where, and how
- 5.1.2 Use the inverted pyramid method to develop a news story
- 5.1.3 Write a news article using the AP Stylebook
- 5.1.4 Conduct a peer review and edit a newsletter

**Performance Standard 5.2: Examine the Field of Public Relations**

- 5.2.1 Explain the difference between public relations and marketing
- 5.2.2 Write a press release using the AP Stylebook
- 5.2.3 Create an informative brochure to assist an agriculturist and/or local industry
- 5.2.4 Compare proactive and reactive public relations strategies
- 5.2.5 Examine strategies to promote agriculture literacy
- 5.2.6 Examine strategies to promote agriculture with social networking
- 5.2.7 Compare agriculture promotion groups

**Performance Standard 5.3: Explore Broadcast Journalism**

- 5.3.1 Describe the agriculture broadcast media types
- 5.3.2 Identify career opportunities in the agriculture broadcast industry
- 5.3.3 Create a script for a video or podcast
- 5.3.4 Develop a video clip or podcast on an agriculture issue

**Performance Standard 5.4: Examine Online Journalism**

- 5.4.1 Compare types of online journalism techniques (i.e., blogging, websites, social networking, e-news, and mobile technologies)
- 5.4.2 Discuss safe and ethical use of online communications

**Performance Standard 5.5: Conduct Page Layout and Design**

- 5.5.1 Identify characteristics of high-quality photographs for media use
- 5.5.2 Demonstrate appropriate captioning and citations
- 5.5.3 Design a print, online or electronic publication using basic graphic design principles

**CONTENT STANDARD 6.0: EXPLORE PUBLIC POLICY IN AGRICULTURE****Performance Standard 6.1: Examine Agriculture Policy Issues**

- 6.1.1 Research policies of agriculture organizations
- 6.1.2 Investigate pros and cons of an agriculture policy issue
- 6.1.3 Present a recommendation for an agriculture policy issue
- 6.1.4 Examine diversity and its effect on the agriculture industry

**Performance Standard 6.2: Explore the Political Process**

- 6.2.1 Connect the role of elected officials to their constituents
- 6.2.2 Chart the process of how laws are made on the local, county, state, and federal level
- 6.2.3 Identify the requirements for serving as a county commissioner
- 6.2.4 Summarize the need for a code of ethics within an organization
- 6.2.5 Discuss how citizens and interest groups can affect the political process
- 6.2.6 Identify public relations strategies used within a political campaign
- 6.2.7 Write a letter to an elected official regarding an agricultural issue

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**CONTENT STANDARD 7.0: EXPLORE CAREER OPPORTUNITIES IN THE AGRICULTURE  
COMMUNICATION AND POLICY FIELDS****Performance Standard 7.1: Understand Employment Fields in the Agriculture Communication  
and Policy Fields**

- 7.1.1 List and describe the types of employment opportunities in agricultural communications
- 7.1.2 List and describe the types of employment opportunities in agricultural organizations
- 7.1.3 Explore education and training for different agricultural communication careers

**CONTENT STANDARD 8.0: PARTICIPATE IN LEADERSHIP TRAINING THROUGH MEMBERSHIP IN FFA****Performance Standard 8.1: Recognize the Traits of Effective Leaders and Participate in  
Leadership Training Through Involvement in FFA**

- 8.1.1 Expand leadership experience by serving as a chapter officer or on a committee
- 8.1.2 Participate in a career development event at the local level or above
- 8.1.3 Plan and implement a leadership development workshop using the “Magic Formula” as found on ffa.org

**Performance Standard 8.2: Understand the Importance of School and Community Awareness**

- 8.2.1 Participate in a school improvement or community development project
- 8.2.2 Plan and implement an agriculture literacy event

**CONTENT STANDARD 9.0: DESCRIBE THE RELATIONSHIP BETWEEN A SUPERVISED AGRICULTURAL  
EXPERIENCE (SAE) AND PREPARATION OF STUDENTS FOR A CAREER IN  
AGRICULTURE****Performance Standard 9.1: Maintain a Supervised Agricultural Experience**

- 9.1.1 Accurately maintain SAE record books
- 9.1.2 Investigate the proficiency award areas related to SAE program area
- 9.1.3 Research organizations that support your SAE
- 9.1.4 Actively pursue necessary steps to receive higher degrees in FFA

## Complementary Course Standards Environmental and Natural Resources

### CONTENT STANDARD 1.0: EXPLORE ENVIRONMENTAL NATURAL RESOURCE MANAGEMENT

#### Performance Standard 1.1: Investigate the Relationship Between Natural Resources and Society, Including Conflict Management

- 1.1.1 Define natural resource management
- 1.1.2 Identify and compare major natural resource management agencies and companies
- 1.1.3 Describe human dependency and demands on natural resources
- 1.1.4 Explain natural resource conservation
- 1.1.5 Investigate the effects of multiple uses of natural resources (e.g., recreation, mining, agriculture, forestry, public lands grazing, etc.)
- 1.1.6 Analyze societal issues related to natural resource management

#### Performance Standard 1.2: Explain Interrelationships Between Natural Resources and Humans in Managing Natural Environments

- 1.2.1 Explain the effects and/or trade-off of population growth, greater energy consumption, and increased technology and development on natural resources and the environment
- 1.2.2 Explain the effects and/or trade-offs of traditional consumptive uses of renewable natural resources (e.g., logging, grazing, hunting)
- 1.2.3 Assess the responsibility of individuals in stewardship of the environment
- 1.2.4 Research and debate one or more current issues related to the conservation or preservation of natural resources

#### Performance Standard 1.3: Research the History of Conservation in the United States

- 1.3.1 Summarize the history of natural resource conservation
- 1.3.2 Critique the national policies that impact natural resource conservation

#### Performance Standard 1.4: Explore Population Ecology

- 1.4.1 Analyze factors that affect population density and dispersion
- 1.4.2 Explain the effects and/or tradeoff of population growth
- 1.4.3 Investigate carrying capacity on environmental resources
- 1.4.4 Explain how species become endangered or extinct
- 1.4.5 Identify management practices used to help populations recover

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**CONTENT STANDARD 2.0: INVESTIGATE ECOLOGICAL CONCEPTS AND SCIENCE PRINCIPLES RELATED TO ENVIRONMENTAL NATURAL RESOURCES****Performance Standard 2.1: Explore Ecological Principles**

- 2.1.1 Evaluate the different biogeochemical cycles (i.e., water, carbon, nitrogen, and phosphorus)
- 2.1.2 Describe the interdependence of organisms within an ecosystem (i.e., food chains and webs)
- 2.1.3 Interpret energy change through an ecosystem (i.e., the energy pyramid)
- 2.1.4 Investigate the first and second Laws of Energy
- 2.1.5 Investigate the processes associated with ecological succession
- 2.1.6 Investigate the processes associated with State-and-Transition models
- 2.1.7 Explain the importance of biodiversity
- 2.1.8 Analyze the impacts of change in biodiversity
- 2.1.9 Summarize how natural processes have been altered (e.g., invasives, exotics, fire intervals, etc.)
- 2.1.10 Define and determine resiliency of ecosystems
- 2.1.11 Differentiate between renewable and nonrenewable natural resources

**Performance Standard 2.2: Explore Ecosystems**

- 2.2.1 Compare and contrast Nevada's ecosystems (i.e., high and low desert, alpine, forest, riparian, and wetlands)
- 2.2.2 Identify factors that differentiate ecosystem and biomes
- 2.2.3 Explore limiting factors within an ecosystem's population

**Performance Standard 2.3: Describe Biological, Physical, and Chemical Properties of Soil**

- 2.3.1 Summarize soil formation factors/Explain the process of soil formation through weathering
- 2.3.2 Examine chemical and biological characteristics of soil/
- 2.3.3 Diagram soil profiles
- 2.3.4 Determine soil classification/Perform a soil texture analysis
- 2.3.5 Perform and analyze a soil test
- 2.3.6 Visually and physically identify soil types
- 2.3.7 Analyze a soil survey
- 2.3.8 Recognize the relationship between vegetation and soil types
- 2.3.9 Learn to identify ecological sites
- 2.3.10 Describe soil erosion and prevention methods
- 2.3.11 Differentiate rock types and relate the composition of mineral matter in soils to parent material
- 2.3.12 Identify land uses, capability factors, and land capability classes
- 2.3.13 Explain how the physical qualities of the soil influence the infiltration and percolation of water
- 2.3.14 Describe the biodiversity found in soil
- 2.3.15 Relate the activities of microorganisms in soil to the environment
- 2.3.16 Conduct tests of soil to determine its use for environmental service systems

**Performance Standard 2.4: Explore Principles of Hydrology and Water Quality**

- 2.4.1 Identify the components of fresh and salt water
- 2.4.2 Describe the world's surface water supplies
- 2.4.3 Discuss the factors that influence the velocity of water through an open channel
- 2.4.4 Explain how the velocity of water influences channel morphology and stream processes
- 2.4.5 Define watersheds and explain their hydrological and ecological function
- 2.4.6 Discriminate between point and nonpoint pollution sources
- 2.4.7 Compare and contrast groundwater and surface water flow measurement methods
- 2.4.8 Conduct and analyze water quality tests
- 2.4.9 Describe the functions of wetlands
- 2.4.10 Illustrate the importance of wetland management
- 2.4.11 Explore the effects of human activity on water quality
- 2.4.12 Explore interactions between climate processes and water quality
- 2.4.13 Explore interactions between water quality and aquatic ecosystems
- 2.4.14 Explore effects of water pollution on humans, animals, and vegetation
- 2.4.15 Research laws and regulations governing water pollution

**Performance Standard 2.5: Explore Principles of Hydrogeology**

- 2.5.1 Differentiate the role of ground water, aquifers, and surface water in the geochemical cycle
- 2.5.2 Describe interactions between groundwater and surface water, including Darcy's Law
- 2.5.3 Define groundwater potential
- 2.5.4 Identify environmental hazards associated with groundwater supplies
- 2.5.5 Describe precautions taken to prevent, and reduce contamination of groundwater supplies
- 2.5.6 Research the cause and effect of groundwater loss

**Performance Standard 2.6: Investigate Watersheds**

- 2.6.1 Identify properties of watersheds
- 2.6.2 Explain watershed management
- 2.6.3 Diagram local watersheds

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**CONTENT STANDARD 3.0: EVALUATING ENVIRONMENTAL QUALITY****Performance Standard 3.1: Investigate Air Quality**

- 3.1.1 Identify components that make up the atmosphere
- 3.1.2 Identify types of air pollutants
- 3.1.3 Differentiate between point and nonpoint source pollution
- 3.1.4 Interpret the role of the atmosphere in creating the greenhouse effect
- 3.1.5 Explore interactions between meteorological processes and air quality
- 3.1.6 Investigate the role of modeling in predicting air quality
- 3.1.7 Explore interactions between climate processes and air quality
- 3.1.8 Investigate the cause and effects of acid rain produced through change in atmospheric composition
- 3.1.9 Collect and analyze air samples
- 3.1.10 Explore the effects of air pollution on humans, animals, and vegetation

**Performance Standard 3.2: Investigate Sustainable Use Practices**

- 3.2.1 Define sustainable use
- 3.2.2 Recognize acceptable sustainable use practices
- 3.2.3 Identify sustainable agriculture practices

**Performance Standard 3.3: Composting**

- 3.3.1 Define compost and composting
- 3.3.2 Explain scientific principles associated with composting, including heat transfer through microbial action
- 3.3.3 Evaluate methods of composting

**Performance Standard 3.4: Recycling**

- 3.4.1 Explain the importance of recycling
- 3.4.2 Describe recycling methods
- 3.4.3 Identify materials that can be recycled
- 3.4.4 Evaluate local recycling programs and methods

**Performance Standard 3.5: Explore Mineral Extraction Resources**

- 3.5.1 Identify local mineral resources
- 3.5.2 Summarize the importance of mineral resources to society
- 3.5.3 Compare the various practices for obtaining mineral resources
- 3.5.4 Evaluate the impact of mining practices on the environment
- 3.5.5 Compare processes for reclaiming areas where minerals have been extracted

**Performance Standard 3.6: Explore Hydroponics**

- 3.6.1 Compare and contrast common hydroponic systems
- 3.6.2 Identify the sustainable benefits of hydroponic production
- 3.6.3 Design a hydroponic system

**CONTENT STANDARD 4.0: EXPLORE PRINCIPLES OF RANGELAND AND FOREST RESOURCE MANAGEMENT****Performance Standard 4.1: Analyze the Interrelationships Between Range Management and Other Natural Resource Activities**

- 4.1.1 Compare and contrast range and rangeland
- 4.1.2 Identify the major rangeland types in Nevada
- 4.1.3 Identify characteristics of healthy rangeland
- 4.1.4 Assess different methods of rangeland improvement
- 4.1.5 Compare public and private use of rangeland

**Performance Standard 4.2: Identify Common Nevada Rangeland Plants**

- 4.2.1 Identify morphological characteristics of grasses, grass-like plants, forbs and woody plants
- 4.2.2 Construct dichotomous key for range plants
- 4.2.3 Assemble a plant collection using proper mounting techniques
- 4.2.4 Identify important Nevada rangeland plants and evaluate their use by animals

**Performance Standard 4.3: Apply Rangeland Monitoring Practices**

- 4.3.1 Describe various range sampling methods and the attributes measured by those samples
- 4.3.2 Determine stocking rates based on animal demand and forage supply
- 4.3.3 Evaluate a rangeland scenario, and develop a management plan for improvement
- 4.3.4 Review important laws affecting rangelands (e.g., Wild Horse and Burro Act, FLPMA, etc.)

**Performance Standard 4.4: Identify Important Forest and Woodland types in Nevada**

- 4.4.1 Compare piñon-juniper woodland locations to mixed conifer forests locations
- 4.4.2 Identify where cottonwood/aspen forests would be located by ecological site descriptions

**Performance Standard 4.5: Investigate Forest Ecology**

- 4.5.1 Investigate the effects of wildlife on forest ecology
- 4.5.2 Examine the role of grazing on forest ecology
- 4.5.3 Predict the effect of fire on forest ecology
- 4.5.4 Analyze the effects of disease and insects on forest ecology

**CONTENT STANDARD 5.0: UNDERSTAND FIRE ECOLOGY DYNAMICS****Performance Standard 5.1: Explore the Effects of Fire on the Ecosystem**

- 5.1.1 List the three components of the fire triangle
- 5.1.2 Discuss the fire behavior triangle (fuel, weather, and topography)
- 5.1.3 Interpret the factors affecting fire frequency today in Nevada
- 5.1.4 Describe the social, economic and ecological effects of wildland fire



**Performance Standard 5.2: Assess Fuel Management Techniques**

- 5.2.1 Define the fire cycle
- 5.2.2 Connect the relationship between fuel loading and fire intensity
- 5.2.3 Compare the factors that affect the fire cycle
- 5.2.4 Examine the role of fuel management in an ecosystem, including mechanical, herbicide, grazing and prescribed fire treatments

**CONTENT STANDARD 6.0: UNDERSTAND THE IMPORTANCE AND APPLICATION OF GPS/GIS IN NATURAL RESOURCE MANAGEMENT****Performance Standard 6.1: Investigate GPS/GIS Systems and Their Applications**

- 6.1.1 Define the uses of geographic information systems (GIS) and spatial analysis as it applies to natural resource management
- 6.1.2 Describe the purpose and function of a Global Positioning System (GPS) / Explain how a GPS unit acquires its signals to define a location
- 6.1.3 Demonstrate the ability to use a GPS unit by navigating and collecting waypoints / Demonstrate the ability to use a GPS unit, including waypoints, distance, and calibration

**Performance Standard 6.2: Demonstrate the Use of Land Management Maps**

- 6.2.1 Use legal descriptions to identify locations and acreage
- 6.2.2 Identify symbols on topographical maps
- 6.2.3 Predict terrain based on topographical maps
- 6.2.4 Demonstrate the ability to find GPS locations on a topographic map
- 6.2.5 Using computerized mapping systems such as Google Earth, identify and describe components of a particular location, e.g., topography, potential vegetation, elevation

**Performance Standard 6.3: Explore Remote Sensing**

- 6.3.1 Explain the function of remote sensing
- 6.3.2 Analyze applications for remote sensing

**CONTENT STANDARD 7.0: INVESTIGATE FISH AND WILDLIFE ECOLOGY****Performance Standard 7.1: Explore the Importance and Distribution of Fish and Wildlife Resources in Nevada**

- 7.1.1 Identify the seven categories of wildlife (big game, fur bearers, predators, upland game, waterfowl, fish and non-game)
- 7.1.2 Connect the distribution of wildlife associated with various habitats in Nevada
- 7.1.3 Describe the importance of wildlife, including indigenous and migratory species, their physical and behavioral characteristics, habitat, and management
- 7.1.4 List impacts on wildlife habitat
- 7.1.5 Describe techniques used in the harvesting of wildlife
- 7.1.6 Describe techniques used in the processing of wildlife
- 7.1.7 Summarize appropriate hunting and fishing safety practices

**Performance Standard 7.2: Examine the Value of Riparian Areas on Wildlife Management**

- 7.2.1 Define riparian habitat
- 7.2.2 Compare riparian habitat characteristics and uses to upland habitat characteristics and uses
- 7.2.3 Differentiate between riparian habitat management strategies

**Performance Standard 7.3: Examine the Endangered Species Issues**

- 7.3.1 Differentiate between threatened and endangered species management strategies
- 7.3.2 Explore the listing process under the Endangered Species Act (ESA) and what it takes to delist a species
- 7.3.3 Identify the agency and their jurisdiction for implementation of ESA
- 7.3.4 Summarize a case history of an endangered species as it relates to socioeconomic impacts

**CONTENT STANDARD 8.0: EXAMINE THE USE OF RENEWABLE AND NONRENEWABLE RESOURCES AND MANAGEMENT****Performance Standard 8.1: Examine Mineral Resources and Management**

- 8.1.1 Identify local mineral resources
- 8.1.2 Summarize the importance of mineral resources to society
- 8.1.3 Compare the various practices for obtaining mineral resources
- 8.1.4 Evaluate the impact of mining practices on the environment
- 8.1.5 Compare processes for reclaiming areas where minerals have been extracted

**Performance Standard 8.2: Recognize the Types and Importance of Energy Resources**

- 8.2.1 Differentiate between renewable and nonrenewable energy resources
- 8.2.2 Investigate types of renewable energy resources
- 8.2.3 Compare types of electrical power generation
- 8.2.4 Identify the different natural resources for energy production
- 8.2.5 Analyze positive and negative impacts of energy development on the environment

**CONTENT STANDARD 9.0: EXPLORE ENERGY SOURCES****Performance Standard 9.1: Investigate Conventional Fuels**

- 9.1.1 Identify conventional energy sources
- 9.1.2 Compare and contrast conventional energy sources
- 9.1.3 Evaluate the impact the burning of fossil fuels has on the environment
- 9.1.4 List measures to reduce energy consumption and explain how that may impact the environment

**Performance Standard 9.2: Investigate Alternative Energy Resources**

- 9.2.1 Identify renewable energy sources (i.e., solar, wind, hydropower, and cogeneration)
- 9.2.2 Compare and contrast alternative energy sources
- 9.2.3 Evaluate the impact of alternative energy sources on the environment
- 9.2.4 Research the advantages and disadvantages of nuclear power production
- 9.2.5 Summarize the process of nuclear power generation

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**CONTENT STANDARD 10.0: ASSESS ENVIRONMENTAL SITE MANAGEMENT****Performance Standard 10.1: Explore Hazardous Materials Management Systems**

- 10.1.1 Identify types of hazardous materials
- 10.1.2 Describe risks associated with hazardous materials
- 10.1.3 Describe OSHA required safety practices in handling and disposal of hazardous materials
- 10.1.4 Respond to a mock hazardous material emergency situation
- 10.1.5 Interpret MSDS sheets

**Performance Standard 10.2: Explore Incineration Systems**

- 10.2.1 Explain the concepts associated with solid waste incineration
- 10.2.2 Describe the environmental impact of solid waste incineration
- 10.2.3 Evaluate methods of incinerating solid waste, including those used in waste to energy plants

**Performance Standard 10.3: Explore Sanitary Landfill Systems**

- 10.3.1 Define sanitary landfill
- 10.3.2 Explain basic sanitary landfill operating procedures and design
- 10.3.3 Evaluate sanitary landfill procedures

**Performance Standard 10.4: Explore Solid Waste Management Systems**

- 10.4.1 Differentiate between different types of solid waste
- 10.4.2 Evaluate environmental hazards created by different types of solid waste, solid waste accumulation, and solid waste disposal
- 10.4.3 Recognize the byproducts of solid waste treatment (i.e., leachate and methane)
- 10.4.4 Identify solid waste management issues in agricultural operations

**Performance Standard 10.5: Explore Wastewater Treatments**

- 10.5.1 Define wastewater
- 10.5.2 Differentiate between wastewater treatment technologies
- 10.5.3 Discuss practical management options for wastewater treatment byproducts

**Performance Standard 10.6: Explore Public Drinking Water Treatments**

- 10.6.1 Examine the chemical and physical properties of drinking water
- 10.6.2 Define source water quality
- 10.6.3 Illustrate the steps in the public drinking water treatment process, highlighting the chemistry of the process
- 10.6.4 Demonstrate the use of water-testing instruments and equipment for public drinking water

**CONTENT STANDARD 11.0: ENVIRONMENTAL LAW AND PUBLIC POLICY****Performance Standard 11.1: Explore Current Environmental Issues**

- 11.1.1 Distinguish between the concepts of conservation and preservation of natural resources
- 11.1.2 Explore GMOs' role in food production and their impact on society and environment
- 11.1.3 Investigate endangered species issues and their impact on society and the environment
- 11.1.4 Analyze the effect of non-native and invasive species on the environment
- 11.1.5 Explore issues surrounding causes and effects of climate change
- 11.1.6 Explore issues with allocation of water rights

**Performance Standard 11.2: Understand the Purposes of Major Laws Impacting Environmental Services**

- 11.2.1 Explain requirements of the Clean Air Act
- 11.2.2 Discuss requirements of the Endangered Species Act
- 11.2.3 Explain requirements of the Clean Water Act
- 11.2.4 Explain requirements of the Nuclear Waste Policy Act
- 11.2.5 Explain requirements of the Safe Drinking Water Act
- 11.2.6 Explain requirements of the Resource Conservation Recovery Act
- 11.2.7 Discuss requirements of the National Environmental Policy Act
- 11.2.8 Explain the requirement of the National Historical Preservation Act of 1966
- 11.2.9 Describe job-related activities subject to the Occupational Safety and Health Administration (OSHA)

**CONTENT STANDARD 12.0: EXPLORE CAREER OPPORTUNITIES IN THE NATURAL RESOURCE AND ENVIRONMENTAL MANAGEMENT FIELDS****Performance Standard 12.1: Understand Employment Fields in the Natural Resource Management Industry**

- 12.1.1 List and describe the types of employment opportunities in natural resource and environmental management
- 12.1.2 Research potential careers in environmental science and management systems
- 12.1.3 Explore education and training for different natural resource management careers
- 12.1.4 Understand the process of choosing a career path in the environmental natural resources industry
- 12.1.5 Research additional industry certifications available

**CONTENT STANDARD 13.0: PARTICIPATE IN LEADERSHIP TRAINING THROUGH MEMBERSHIP IN FFA****Performance Standard 13.1: Recognize the Traits of Effective Leaders and Participate in Leadership Training Through Involvement in FFA**

- 13.1.1 Expand leadership experience by serving as a chapter officer or on a committee
- 13.1.2 Exhibit leadership skills by demonstrating proper parliamentary procedure
- 13.1.3 Participate in a career development event at the local level or above

**Performance Standard 13.2: Understand the Importance of School and Community Awareness**

13.2.1 Participate in a school improvement or community development project

**CONTENT STANDARD 14.0: DESCRIBE THE RELATIONSHIP BETWEEN A SUPERVISED AGRICULTURAL EXPERIENCE (SAE) AND PREPARATION OF STUDENTS FOR A CAREER IN AGRICULTURE**

**Performance Standard 14.1: Maintain a Supervised Agricultural Experience**

- 14.1.1 Accurately maintain SAE record books
- 14.1.2 Investigate the proficiency award areas related to SAE program area
- 14.1.3 Research organizations that support your SAE program
- 14.1.4 Actively pursue necessary steps to receive higher degrees in FFA

## Complementary Course Standards

### Food Science Technology

#### CONTENT STANDARD 1.0: FOOD INDUSTRY AND HISTORICAL DEVELOPMENT

##### Performance Standard 1.1: Evaluate the Significance and Implications of Changes and Trends in the Food Products and Processing Industry

- 1.1.1 Discuss historical changes in the food products and processing industry
- 1.1.2 Evaluate current trends in the food products and processing industry (i.e., dietary food guides, niche markets, marketing trends)
- 1.1.3 Examine issues of safety and environmental concerns in food products and processing (i.e., Genetically Modified Organisms, microorganisms, contamination, irradiation)

##### Performance Standard 1.2: Investigate Industry Organizations, Groups and Regulatory Agencies Affecting the Food Products and Processing Industry

- 1.2.1 Explain the purposes of organizations that are part of and/or regulate the food products and processing industry
- 1.2.2 Determine the relationship between regulatory agencies (i.e., FDA, USDA, CDC, WHO, etc.) and the food products and processing industry
- 1.2.3 Discuss the application of industry standards in the food products and processing industry (i.e., American Meat Science Association, Nevada Dairy Commission, Dairy Farmers of America, Nevada Cattlemen's Association)

#### CONTENT STANDARD 2.0: FOOD SAFETY AND SANITATION

##### Performance Standard 2.1: Manage Operational Procedures and Create Equipment and Facility Maintenance Plans

- 2.1.1 Evaluate the Sanitation Standard Operating Procedures (SSOP) of a food products and processing company
- 2.1.2 Justify the Good Manufacturing Practices (GMP) of a food products and processing company
- 2.1.3 Develop a basic equipment and facility maintenance program

##### Performance Standard 2.2: Implement Hazard Analysis and Critical Control Point (HACCP) Procedures to Establish Operating Parameters

- 2.2.1 Outline procedures to eliminate possible contamination hazards (i.e., physical, chemical, and biological) associated with food products and processing
- 2.2.2 Explain the implementation of the seven principles of HACCP
- 2.2.3 Analyze the effectiveness of a food products and processing company's Critical Control Point procedures

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**CONTENT STANDARD 3.0: THE SCIENCE OF FOOD PRODUCTS AND PROCESSING****Performance Standard 3.1: Apply Principles of Science to Food Processing to Provide a Safe, Wholesome, and Nutritious Food Supply**

- 3.1.1 Design a research project in food science using the scientific method
- 3.1.2 Explain how the chemical and physical properties of foods influence nutritional value and eating quality
- 3.1.3 Compare and contrast the nutritive value of food and food groups
- 3.1.4 Differentiate between the common food constituents (i.e., proteins, carbohydrates, fats, vitamins, minerals, and water)
- 3.1.5 Describe the purpose of common food additives

**CONTENT STANDARD 4.0: FOOD SELECTION AND PROCESSING****Performance Standard 4.1: Utilize Harvesting, Selection, and Inspection Techniques to Obtain Quality Food Products for Processing**

- 4.1.1 Discuss factors that affect quality and yield grades of food products
- 4.1.2 Perform quality control inspections of raw food products for processing
- 4.1.3 Compare and contrast accepted animal treatment and harvesting techniques
- 4.1.4 Explain desirable and undesirable characteristics of both pre-mortem and post-mortem animals in relation to the production of food products

**Performance Standard 4.2: Evaluate, Grade, and Classify Processed Food Products**

- 4.2.1 Evaluate, grade, and classify processed meat, eggs, poultry, fish, and dairy products
- 4.2.2 Evaluate, grade, and classify processed products from fruits and vegetables
- 4.2.3 Evaluate, grade, and classify finished products derived from grains, legumes, and oilseeds

**CONTENT STANDARD 5.0: FOOD PROCESSING AND PRESERVATION****Performance Standard 5.1: Process and Preserve Food and Food Products for Sale and Distribution**

- 5.1.1 Use weights and measures to formulate and package food products
- 5.1.2 Evaluate foods prepared for the fresh-food market based on factors such as shelf life, shrinkage, appearance, and weight
- 5.1.3 Preserve foods using various methods and techniques
- 5.1.4 Evaluate ready-to-use food products
- 5.1.5 Analyze the foods stored in various packaging materials to retain desirable food qualities
- 5.1.6 Compare and contrast foods stored under varying conditions for quality, shelf life, and intended use

**Performance Standard 5.2: Present Food and Food Products for Sale and Distribution**

- 5.2.1 Explain the required components of a food label
- 5.2.2 Prepare and label foods according to the established standards of regulatory agencies
- 5.2.3 Formulate a new food product

**CONTENT STANDARD 6.0: MARKETING AND SALES STRATEGIES****Performance Standard 6.1: Explain the Basics of Sales**

- 6.1.1 Market a food product to a target audience
- 6.1.2 Complete a sales invoice
- 6.1.3 Use proper telephone techniques
- 6.1.4 Properly handle a customer complaint
- 6.1.5 Conduct a customer consultation

**CONTENT STANDARD 7.0: EXPLORE CAREER OPPORTUNITIES****Performance Standard 7.1: Understand Employment Fields in the Food Science Technology Industry**

- 7.1.1 List and describe the types of employment opportunities in the Food Science Technology industry
- 7.1.2 Explore education and training for different Food Science Technology careers
- 7.1.3 Understand the process of choosing a career path in the Food Science Technology industry

**CONTENT STANDARD 8.0: PARTICIPATE IN LEADERSHIP TRAINING THROUGH MEMBERSHIP IN FFA****Performance Standard 8.1: Recognize the Traits of Effective Leaders and Participate in Leadership Training Through Involvement in FFA**

- 8.1.1 Expand leadership experience by serving as a chapter officer or on a committee
- 8.1.2 Exhibit leadership skills by demonstrating proper parliamentary procedure
- 8.1.3 Participate in a career development event at the local level or above

**Performance Standard 8.2: Understand the Importance of School and Community Awareness**

- 8.2.1 Participate in a school improvement or community development project

**CONTENT STANDARD 9.0: DESCRIBE THE RELATIONSHIP BETWEEN A SUPERVISED AGRICULTURAL EXPERIENCE (SAE) AND PREPARATION OF STUDENTS FOR A CAREER IN AGRICULTURE****Performance Standard 9.1: Maintain a Supervised Agricultural Experience**

- 9.1.1 Accurately maintain SAE record books
- 9.1.2 Investigate the proficiency award areas related to SAE program area
- 9.1.3 Research organizations that support your SAE program
- 9.1.4 Actively pursue necessary steps to receive higher degrees in FFA



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## Complementary Course Standards Greenhouse and Landscape Management

### CONTENT STANDARD 1.0: PRACTICE SAFETY IN THE GREENHOUSE AND LANDSCAPE INDUSTRY

#### Performance Standard 1.1: Properly Perform Safe Work Practices

- 1.1.1 Identify and properly use personal protection equipment
- 1.1.2 Read, understand and follow label directions and MSDS
- 1.1.3 Properly identify common hand tools and power equipment
- 1.1.4 Safely use common hand tools and power equipment
- 1.1.5 Complete worker protection handler verification card training

### CONTENT STANDARD 2.0: USE PLANT IDENTIFICATION SKILLS

#### Performance Standard 2.1: Categorize Plants

- 2.1.1 Correctly categorize common nursery and landscape plants by life cycle (i.e., annuals, perennials, etc.)
- 2.1.2 Correctly categorize plants by growth habits (i.e., mounding, trailing, etc.)
- 2.1.3 Utilize resources to establish plant suitability for a selected site (i.e., Hardiness Zone Maps, Heat Zone Maps)
- 2.1.4 Identify common greenhouse and landscape plants by botanical and common names
- 2.1.5 Correctly categorize landscape plants by life cycle (i.e., annuals, perennials, trees, groundcovers)

### CONTENT STANDARD 3.0: SELECT PLANT MATERIALS FOR A LANDSCAPE DESIGN

#### Performance Standard 3.1: Identify Environmental Factors That Determine Selection

- 3.1.1 Analyze soil characteristics that influence plant selection
- 3.1.2 Analyze climate characteristics that influence plant selection
- 3.1.3 Analyze water use requirements that influence plant selection

#### Performance Standard 3.2: Identify Growth Characteristics That Influence Plant Selection

- 3.2.1 Classify plants by mature size
- 3.2.2 Classify plants by form (i.e., weeping, columnar, spreading)
- 3.2.3 Classify plants by color
- 3.2.4 Classify plants by texture
- 3.2.5 Distinguish between deciduous and evergreen plants

#### Performance Standard 3.3: Identify Plants by Their Function in the Landscape

- 3.2.1 Classify plants by mature size
- 3.2.2 Classify plants by form (i.e., weeping, columnar, spreading)
- 3.2.3 Classify plants by color
- 3.2.4 Classify plants by texture
- 3.2.5 Distinguish between deciduous and evergreen plants

**Performance Standard 3.3: Identify Plants by Their Function in the Landscape**

- 3.3.1 Categorize trees by function (i.e., shade, accent, fruit, windbreak)
- 3.3.2 Categorize shrubs by function (i.e., specimen, border, accent, foundation)
- 3.3.3 Categorize herbaceous plants by function (i.e., borders, accent, color beds, containers)
- 3.3.4 Categorize grasses by function (i.e., accent, ornamental, turf)

**Performance Standard 3.4: Evaluate Nursery Stock Quality**

- 3.4.1 Recognize healthy plant characteristics
- 3.4.2 Distinguish between healthy versus defective roots
- 3.4.3 Evaluate nursery stock according to American Association of Nurserymen standards

**CONTENT STANDARD 4.0: APPLY THE PRINCIPLES AND ELEMENTS OF DESIGN****Performance Standard 4.1: Explore Principles of Design**

- 4.1.1 Compare and contrast balance using symmetry, asymmetry, and massing
- 4.1.2 Select appropriate sites for emphasis in the landscape
- 4.1.3 Determine appropriate proportion and scale in a design
- 4.1.4 Illustrate how lines establish rhythm in a design
- 4.1.5 Discuss the relationship of color to emotions/symbolism
- 4.1.6 Use color, texture, and form to create a desired atmosphere
- 4.1.7 Critique unity of the landscape design

**CONTENT STANDARD 5.0: DESIGNING THE LANDSCAPE AREAS****Performance Standard 5.1: Explore the Outdoor Room Concept**

- 5.1.1 Distinguish the major areas of a residential landscape
- 5.1.2 Assess design guidelines for the public space
- 5.1.3 Explain aspects of outdoor living spaces
- 5.1.4 Describe the functions of a service area

**Performance Standard 5.2: Compile Information in Preparation for Landscape Design Work**

- 5.2.1 Determine the client's need and desires
- 5.2.2 Analyze the site conditions
- 5.2.3 Prepare a site analysis plan

**Performance Standard 5.3: Apply Basic Drafting Techniques to a Landscape Design**

- 5.3.1 Differentiate between architect and engineer scales
- 5.3.2 Identify drafting equipment, and demonstrate its proper use

**Performance Standard 5.4: Create a Bubble Diagram**

- 5.4.1 Recognize and use common symbols in a bubble diagram
- 5.4.2 Identify use areas with a bubble diagram
- 5.4.3 Identify traffic patterns with a bubble diagram
- 5.4.5 Identify hydrozones with a bubble diagram

**Performance Standard 5.5: Create Industry Standard Plan Drawing**

- 5.5.1 Create a base plan to scale
- 5.5.2 Apply the principles and elements of design to a landscape plan
- 5.5.3 Select and place appropriate plant materials for the landscape plan
- 5.5.4 Select and place appropriate hardscape materials for the landscape plan
- 5.5.5 Create plant legends (schedules) from a design
- 5.5.6 Create irrigation legends (schedules) from a design

**CONTENT STANDARD 6.0: EXPLORE HARDSCAPES IN LANDSCAPE PLANNING****Performance Standard 6.1: Select Hardscape Materials**

- 6.1.1 Define hardscape
- 6.1.2 List components in a hardscape design (i.e., patios, water features, walkways, shade structures)
- 6.1.3 Compare and contrast wall types used in the landscape (i.e., retaining, seat, decorative)
- 6.1.4 Compare and contrast materials used in hardscapes

**Performance Standard 6.2: Examine Hardscape Construction Techniques**

- 6.2.1 Compare and contrast walkway construction materials and methods (i.e., concrete, pavers, stone)
- 6.2.2 Compare and contrast wall construction materials and methods (i.e., poured in place, cinderblock, segmental retaining wall)
- 6.2.3 Compare and contrast fence construction materials and methods (i.e., wood, vinyl, metal)
- 6.2.4 Compare and contrast deck construction materials and methods (i.e., wood, composite, concrete)

**CONTENT STANDARD 7.0: EXPLORE LANDSCAPE AND GREENHOUSE IRRIGATION SYSTEMS****Performance Standard 7.1: Prepare for Installation of Irrigation System**

- 7.1.1 Analyze site conditions
- 7.1.2 Calculate area coverage dimensions
- 7.1.3 Establish design capacity of the site (flow rate in gallons per minute and pressure in pounds per square inch)
- 7.1.4 Identify components of drip and sprinkler irrigation systems (i.e., pipes, fittings, valves)

**Performance Standard 7.2: Design a Turf Sprinkler System**

- 7.2.1 Recognize common symbols and detail drawings used in an irrigation design
- 7.2.2 Establish sprinkler pattern and spacing
- 7.2.3 Calculate number of sprinkler heads, valves, and drains and the length of pipe needed
- 7.2.4 Calculate the cost of the parts, supplies, and labor for system installation
- 7.2.5 Select appropriate controller for system

**Performance Standard 7.3: Design a Drip System**

- 7.3.1 Recognize common symbols and detail drawings used in a drip system
- 7.3.2 Establish emitter pattern and spacing
- 7.3.3 Calculate number of emitters, valves, drains and the length of pipe and tubing needed
- 7.3.4 Calculate the cost of the parts, supplies, and labor for system installation
- 7.3.5 Select appropriate controller for system

**Performance Standard 7.4: Maintain an Irrigation System**

- 7.4.1 Explain how leaks impact system performance
- 7.4.2 Identify symptoms from leaks or broken components
- 7.4.3 List the procedure for repairing broken heads
- 7.4.4 List the procedure for replacing heads
- 7.4.5 Determine the correct procedure for adjusting the height and spray of sprinklers
- 7.4.6 Determine the potential causes of faulty valves

**CONTENT STANDARD 8.0: INSTALL A LANDSCAPE AREA BASED ON A LANDSCAPE DESIGN****Performance Standard 8.1: Prepare a Landscape Site**

- 8.1.1 Prepare landscape site to establish grade
- 8.1.2 Locate utilities
- 8.1.3 Perform soil remediation techniques
- 8.1.4 Install irrigation system

**Performance Standard 8.2: Install Plants**

- 8.2.1 Calculate landscape measurements
- 8.2.2 Layout plant placement per design
- 8.2.3 Prepare planting holes using best management practices of the landscape industry
- 8.2.4 Plant seeds, bulbs, ground covers, annuals, perennials, and/or woody plants according to best management practices of the landscape industry
- 8.2.5 Provide post-planting care, such as appropriate watering, bracing, and mulching

**Performance Standard 8.3: Prepare a Cost Estimate for a Landscape Plan**

- 8.3.1 Differentiate between an estimate and a bid
- 8.3.2 Calculate the amount of time required to complete a job
- 8.3.3 Define overhead costs
- 8.3.4 Prepare a final bid for the landscape design and installation project

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**CONTENT STANDARD 9.0: EXPLORE TURFGRASS INSTALLATION AND MAINTENANCE PRACTICES****Performance Standard 9.1: Selection of Turfgrasses**

- 9.1.1 Select grasses according to potential use and environment
- 9.1.2 Distinguish between warm and cool season grass species
- 9.1.3 Distinguish between bunch and spreading grasses
- 9.1.4 Interpret a seed label
- 9.1.5 Research local turf restrictions

**Performance Standard 9.2: Examining Methods of Turfgrass Establishment**

- 9.2.1 Compare and contrast methods of establishment (i.e., seed, sod, plugging, sprigging)
- 9.2.2 Compare and contrast equipment used for establishment

**Performance Standard 9.3: Managing Turfgrass**

- 9.3.1 Summarize turfgrass irrigation practices
- 9.3.2 Select appropriate turfgrass fertilizer
- 9.3.3 Compare and contrast the use of reel and rotary mowers
- 9.3.4 Justify the need for thatch control and core cultivation (aeration)
- 9.3.5 Demonstrate proper mowing practices
- 9.3.6 Describe turfgrass pest control strategies associated with IPM

**CONTENT STANDARD 10.0: TREE AND SHRUB MANAGEMENT PRACTICES****Performance Standard 10.1: Explore Pruning Practices**

- 10.1.1 Identify tools used for pruning trees and shrubs
- 10.1.2 Demonstrate industry standard practices for pruning trees and shrubs

**Performance Standard 10.2: Explore Mulching**

- 10.2.1 Compare and contrast organic and inorganic mulches
- 10.2.2 Summarize the benefits of mulching
- 10.2.3 Calculate volume of mulch required for a site

**Performance Standard 10.3: Managing Trees and Shrubs**

- 10.3.1 Select appropriate fertilizers and application methods
- 10.3.2 Summarize irrigation practices
- 10.3.3 Describe pest control strategies associated with IPM

**CONTENT STANDARD 11.0: EXPLORE INTEGRATED PEST MANAGEMENT (IPM)****Performance Standard 11.1: Describe Integrated Pest Management**

- 11.1.1 Define Integrated Pest Management (IPM)
- 11.1.2 Summarize the benefits of IPM

**Performance Standard 11.2: Explore Common Pests and Diseases**

- 11.2.1 Identify types of plant pests and diseases
- 11.2.2 Identify weed, insect, rodent, and fungi pests
- 11.2.3 Differentiate between infectious and noninfectious diseases

**Performance Standard 11.3: Explain Procedures for the Safe Handling, Use and Storage of Pesticides**

- 11.3.1 Identify and utilize appropriate safety measures when applying pesticides
- 11.3.2 Interpret pesticide labels
- 11.3.3 Explain procedures for storing and disposing of pesticides
- 11.3.4 Evaluate environmental and consumer concerns regarding pest management and biodiversity
- 11.3.5 Mix pesticides according to label directions
- 11.3.6 Explore requirements for obtaining pesticide applicator licenses

**CONTENT STANDARD 12.0: EXPLORE CAREER OPPORTUNITIES IN THE GREENHOUSE AND LANDSCAPE INDUSTRIES****Performance Standard 12.1: Explore Careers in Horticulture**

- 12.1.1 Research potential careers in ornamental horticulture and plant science
- 12.1.2 Prepare a list of employability skills for a career in the horticulture industry
- 12.1.3 Research additional industry certifications available

**Performance Standard 12.2: Understand Employment Fields in the Landscaping Industry**

- 12.2.1 List and describe the types of employment opportunities in the landscaping industry
- 12.2.2 Explore education and training for different landscaping careers
- 12.2.3 Understand the process of choosing a career path in the landscaping industry
- 12.2.4 Research additional industry certifications available (PLANET, Irrigation Association, etc.)

**CONTENT STANDARD 13.0: PARTICIPATE IN LEADERSHIP TRAINING THROUGH MEMBERSHIP IN FFA****Performance Standard 13.1: Recognize the Traits of Effective Leaders and Participate in Leadership Training Through Involvement in FFA**

- 13.1.1 Expand leadership experience by serving as a chapter officer or on a committee
- 13.1.2 Exhibit leadership skills by demonstrating proper parliamentary procedure
- 13.1.3 Participate in a career skill development event at least at the local level

**Performance Standard 13.2: Understand the Importance of School and Community Awareness**

- 13.2.1 Participate in a school improvement or community development project

**CONTENT STANDARD 14.0: DESCRIBE THE RELATIONSHIP BETWEEN A SUPERVISED AGRICULTURAL EXPERIENCE (SAE) AND PREPARATION OF STUDENTS FOR A CAREER IN AGRICULTURE**

**Performance Standard 14.1: Maintain a Supervised Agricultural Experience**

- 14.1.1 Accurately maintain SAE record books
- 14.1.2 Investigate the proficiency award areas related to SAE program area
- 14.1.3 Research organizations that support your SAE program
- 14.1.4 Actively pursue necessary steps to receive higher degrees in FFA