

End of Course Assessment Blueprint

Principles of Agricultural Science – Plant EoC

The **End-of-Course Assessment Blueprint** aligns CASE 4 Learning (CASE) Concepts and Performance Objectives to the National AFNR Content standards and performance indicators developed by the National Council for Agricultural Education (The Council). The concepts and performance objectives listed in this blueprint are assessed in the **Principles of Agricultural Science – Plant End-of-Course Assessment**. The assessment is available through **NOCTI**, serving as a CASE partner for third-party delivery. Teachers should use this blueprint to prepare their students for the comprehensive **Principles of Agricultural Science – Plant End-of-Course Assessment**.

In the CASE learning model, Concepts are key elements of understanding that students are expected to learn. Concepts are developed by a curriculum committee of content experts comprised of industry representatives, post-secondary educators, and secondary teachers. Performance Objectives are how students will demonstrate their understanding of the concept. All Concepts and Performance Objectives measure student competency of the AFNR Content Standards. The AFNR Content Standards provide state agricultural education leaders and educators with a high-quality, rigorous set of standards to guide what students should know and be able to do after completing a program of study in each of the following AFNR Career Pathways.

- Career Ready Practices (Integrated)
- Foundational Pathway Skills (Integrated)
- Agribusiness Systems
- Animal Systems
- Biotechnology Systems
- Education, Communication, and Leadership
- Environmental Sustainability Systems
- Food Products and Processing Systems
- Natural Resource Systems
- Plant Systems
- Power, Structural, and Technical Systems

DEFINITIONS: Within each pathway, the standards are organized and aligned to the CASE curriculum as follows:

- **Standards** – These are the standards owned by Advance CTE and used here with permission. The standards defined the scope and guided the development of the updated indicators and CASE measurements.
- **Performance Indicators** – These statements distill each standard into more discrete indicators of the knowledge and skills students should attain through a program of study in this pathway. Attainment of the knowledge and skills outlined in the performance indicators is intended to demonstrate an acceptable level of proficiency with the related standard at the conclusion of a program of study in this area.
- **CASE Measurements** – These are CASE Concepts with bulleted Performance Objectives. Students carry out the Performance Objectives to show understanding of the Concept, which indicates attainment of each performance indicator. The beginning CASE measurements require students to remember, understand, identify, explain, and summarize information. The intermediate CASE measurements require students to apply, analyze, compare, distinguish, and examine information and scenarios. The advanced CASE measurements require students to assess, evaluate, justify, improve, and create.

The **Principles of Agricultural Science – Plant End-of-Course Assessment** measures student competencies in the AFNR Pathways included in this blueprint. For more information about the National AFNR Content Standards, visit The National Council for Agricultural Education’s website at <https://thecouncil.ffa.org/afnr/>.

CAREER READY PRACTICES STANDARD

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

Career-ready individuals take personal ownership of their own educational and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the educational and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors and other experts to assist in the planning and execution of career and personal goals.

PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
CRP.10.01. Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.	ASP 1.1 Concept 1 People work in a variety of agricultural enterprises to produce food, fiber, and fuel, which are essential to daily life.	ASP 1.1 Concept 4 Plant industries provide production and management career opportunities.	
	<ul style="list-style-type: none"> Research plant industries and related careers. 	<ul style="list-style-type: none"> Research physical attributes and growth requirements for several species of plants. 	

AGRIBUSINESS SYSTEMS STANDARD

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

PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
ABS.05.03. Assess marketing principles and develop marketing plans to accomplish AFNR business objectives.		ASP 9.2 Concept 2 Product, placement, price, and promotion are the four keys to marketing products.	
		<ul style="list-style-type: none"> Develop a presentation illustrating the four P's of marketing for each of the plant-based industries. 	
		ASP 9.2 Concept 3 There are many products produced within plant-based industries and all require careful planning to ensure the marketability of the product.	
		<ul style="list-style-type: none"> Select crop(s) for a specific situation based on land analysis, local markets, and budget potential. 	

PLANT SYSTEMS STANDARD

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

PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced

PS.01.01. Determine the influence of environmental factors on plant growth.		ASP 6.4 Concept 1 Plant maturity is affected by the accumulation of thermal units during a growing season.	ASP 6.4 Concept 3 Temperature is a principle determinant for plant dormancy of some seeds, bulbs, specialized roots, and species of perennial plants.
		<ul style="list-style-type: none"> Calculate estimated plant maturity dates using growing degree days to compare two geographical locations. 	<ul style="list-style-type: none"> Plant bulbs and schedule flowering for those bulbs to meet a holiday delivery date.
PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
PS.01.02. Prepare and adjust growing media for use in plant systems.	ASP 2.1 Concept 1 Soil texture is a proportion of sand, silt, and clay, and influence how producers use soil.	ASP 2.1 Concept 5 Organic matter affects the porosity and water holding capacity of soils.	ASP 2.2 Concept 1 Soil pH determines the availability of nutrients required for plant growth and health.
	<ul style="list-style-type: none"> Conduct tests to determine soil texture by feel. 	<ul style="list-style-type: none"> Conduct an experiment to explore the relationship between organic matter and water holding capacity of soil. 	<ul style="list-style-type: none"> Conduct a soil sample test to determine pH.
			<p>ASP 2.2 Concept 2 The optimal pH and salinity levels required for plant growth vary among plant species, and producers adjust the levels by using chemical treatments.</p> <ul style="list-style-type: none"> Correct for acidic soil conditions using lime.
PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
PS.01.03. Demonstrate planting techniques and create the conditions needed for seed germination.	ASP 7.3 Concept 1 Germinating seeds from embryo to seedling have visible anatomical parts and growth stages used to identify the plant as either a monocotyledon or a dicotyledon.	ASP 7.2 Concept 2 Plants use seeds to multiply species exponentially over time.	ASP 7.3 Concept 5 Dormancy is a strategy plants utilize to ensure some offspring will germinate at optimal times and plants rely on special treatments, such as light, cold temperatures, and scarification to break seed dormancy.
	<ul style="list-style-type: none"> Identify the structures of seeds and plant embryos Distinguish between monocotyledon and dicotyledon seedlings using anatomical features. 	<ul style="list-style-type: none"> Calculate the reproductive biotic potential of plants. 	<ul style="list-style-type: none"> Perform scarification to treat seeds for seed coat dormancy.
		<p>ASP 7.3 Concept 2 Plant seeds convert starch into glucose by the use of enzymes during the germination process.</p> <ul style="list-style-type: none"> Provide evidence in the form of data related to starch conversion to sugar during a seed germination experiment. 	
PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
	ASP 6.1 Concept 2 Nutrient deficiencies are detected in plants by the examination		ASP 6.1 Concept 3 Nutrients can be added to the soil in various forms, such

PS.01.04. Develop and implement a nutrient management and/or fertilizer plan for specific plants or crops.	of anatomical features and chemical tissue tests		as chemical fertilizers, animal wastes, and organic matter.
	<ul style="list-style-type: none"> Identify the effects of nutrient deficiencies in plants by observing anatomical differences. 		<ul style="list-style-type: none"> Use mathematical formulas to solve problems regarding fertilizer analyses, rates, and cost comparisons.

PLANT SYSTEMS STANDARD

PS.02. Apply principles of classification, plant anatomy, and plant physiology to plant production and management.			
PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
PS.02.01. Classify plants according to taxonomic systems.	ASP 5.1 Concept 1 Plants are organized and identified and using physical characteristics.		ASP 5.1 Concept 4 All plants are named using a binomial system, which is a two-word system for naming plants with the first word being the generic name and the second word being the specific name.
	<ul style="list-style-type: none"> Develop a flowchart to classify 20 different species of plants. 		<ul style="list-style-type: none"> Create a fictitious plant describing the physical features and apply the principles of binomial nomenclature to create a common and scientific name for the plant.
PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
PS.02.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.	ASP 4.1 Concept 2 Plant cells are comprised of many parts dependent upon each other that have essential functions for the survival of plant tissue.	ASP 4.2 Concept 3 Plant roots use differentiated cells that perform specific functions in the root, such as the absorption of water and dissolved nutrients.	ASP 4.3 Concept 3 Environmental conditions, such as temperature and precipitation, are reflected in the growth rates of plants and evidence of those conditions can be found in woody stems.
	<ul style="list-style-type: none"> Identify and label plant cell organelles. Represent relationships between organelles using a graphic organizer 	<ul style="list-style-type: none"> Examine cell differentiation as it relates to root cells. 	<ul style="list-style-type: none"> Create a poster depicting the lifespan of a tree referencing environmental conditions, historical events, and stages of growth.
	ASP 4.2 Concept 1 A plant's root, stem, leaves, and flower are vital for plant health and growth.	ASP 4.1 Concept 4 Cells use water, oxygen, and glucose to produce energy and metabolic by-products of carbon dioxide and water.	ASP 4.4 Concept 3 Leaf cells contain a specialized pigment known as chlorophyll that is used by the plant to harvest radiant energy from the sun.
	<ul style="list-style-type: none"> Describe the function of the major plant parts. 	<ul style="list-style-type: none"> Collect and analyze data to provide evidence of cell metabolism. 	<ul style="list-style-type: none"> Investigate the pigments and food storage systems found in plant leaves.
Performance Indicator (NOCTI Competency)	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced

PS.02.03. Apply knowledge of plant physiology and energy conversion to plant systems.		ASP 6.2 Concept 2 Water is used by plants for the translocation of materials within the vascular systems of plants and used to complete the photosynthesis process.	ASP 6.2 Concept 5 The wilting point is a critical physiological stage that, if exceeded, can cause permanent damage to the health and physical appearance of plants.
		<ul style="list-style-type: none"> Collect evidence of water movement through a stem detecting transpiration pull. 	<ul style="list-style-type: none"> Monitor soil moisture to determine the wilting point of different plant species.
		ASP 6.2 Concept 3 Water is used to help cool the plant during periods of above optimal temperature conditions through the process of transpiration.	
		<ul style="list-style-type: none"> Examine how environmental conditions affect the water loss of a plant. 	
		ASP 6.3 Concept 1 Light is absorbed by chlorophyll and used by plants to convert carbon dioxide and water into glucose and oxygen through the process of photosynthesis.	
		<ul style="list-style-type: none"> Collect evidence of the dependence of photosynthesis with light. 	

PLANT SYSTEMS STANDARD

PS.03. Propagate, culture and harvest plants and plant products based on current industry standards.			
PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
PS.03.01. Demonstrate plant propagation techniques in plant system activities.		ASP 7.1 Concept 4 Dominant and recessive alleles determine the phenotypic characteristics of plants.	ASP 7.4 Concept 1 Some plant hybrids will produce seeds with genetic characteristics that are inconsistent with the parent plant genotype; therefore, producers use asexual propagation methods for reproducing the desired traits.
		<ul style="list-style-type: none"> Perform computer simulations related to genetic heritage to learn about the role genetics play in plant production. 	<ul style="list-style-type: none"> Demonstrate how to perform common asexual propagation methods, such as grafting, budding, layering, division, and cuttings properly.
		ASP 7.4 Concept 2 Using asexual propagation methods, such as grafting, division, budding, layering, or cuttings, are efficient ways to produce new plants exhibiting desired characteristics of a parent plant.	
		<ul style="list-style-type: none"> Compare and contrast different asexual propagation methods. 	
PERFORMANCE INDICATOR	CASE MEASUREMENTS		

	Beginning	Intermediate	Advanced
PS.03.02. Develop and implement a management plan for plant production.		ASP 3.1 Concept 2 There are a variety of ingredients used in potting soil that provide permeability, porosity, and fertility needed for container crops.	ASP 3.1 Concept 3 Greenhouse and nursery plant producers calculate and purchase media in cubic feet or cubic yard increments.
		<ul style="list-style-type: none"> • Test different potting media ingredients to determine the permeability and porosity qualities of the media. • Determine the percentage of ingredients found in a potting soil mixture. 	<ul style="list-style-type: none"> • Calculate the volume of various containers using mathematics.
		ASP 3.2 Concept 2 Careful management and monitoring of water quality in a hydroponic system are necessary to ensure plant health.	
		<ul style="list-style-type: none"> • Compare the use of fertilizers, water, and media in hydroponic and traditional plant production systems. 	
PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
PS.03.03. Develop and implement a plan for integrated pest management for plant production.		ASP 8.1 Concept 3 Proper detection of symptoms can determine plant pest threats.	
		<ul style="list-style-type: none"> • Identify specific symptoms of damage caused by pests. 	
		ASP 8.1 Concept 4 Biological, chemical, and mechanical methods, as well as cultural practices, are options for eradication or deterring pests.	
		<ul style="list-style-type: none"> • Compare and contrast pest eradication and pest control methods. 	
		ASP 8.2 Concept 2 Plant diseases cause visible symptoms in plant growth, such as defoliation, abscesses, growths, and decaying of plant tissue.	
<ul style="list-style-type: none"> • Develop an understanding of plant disease, causes, and means of prevention and control. 			
PERFORMANCE INDICATOR	CASE MEASUREMENTS		
	Beginning	Intermediate	Advanced
	ASP 9.1 Concept 1 Specialized equipment is required for soil tillage	ASP 9.1 Concept 2 The growing environment for plants may be altered by	

PS.03.04. Apply principles and practices of sustainable agriculture to plant production.	and the planting, harvesting, and transporting of agronomic crops.	structures, such as greenhouses, to provide optimal temperature requirements.	
	<ul style="list-style-type: none"> • Categorize machinery used to produce plants according to use. 	<ul style="list-style-type: none"> • Conduct an experiment to determine the effects of greenhouse coverings on temperature. 	