



CTSO Course Alignments: Principles of Plant Science and Hydroculture

Below you will find standards for the Principles of Plant Science and Hydroculture course aligned with competitive events from appropriate career and technical student organizations (CTSOs). Knowing the aligned events for your organization will allow you to have additional tools for teaching course standards, as well as increase student engagement and preparation in your CTSO activities. The final column recommends potential tools from other CTSO organizations. Even if your students are not participating in these organizations, available rubrics, tools, and materials can also add to the instructional resources at your disposal for best teaching your content.

Important to note: While the aligned activities below can be important tools in teaching course standards, it is important to note that events may not cover a standard in its entirety and should not be the sole instructional strategy used to address a standard.

	STANDARD	ALIGNED FFA COMPETITIVE EVENTS/PROGRAMS	OTHER POTENTIAL CTSO TOOLS & RESOURCES
1	Differentiate general occupational safety prevention and control standards as related to the plant science and hydroculture industry. Apply concepts of safety procedures to complete safety test with 100 percent accuracy. Obtain the worker protection standards student industry certification. (TN Reading 3)		<ul style="list-style-type: none"> • SkillsUSA: Occupational Health and Safety
2	Review common laboratory safety procedures for tool and equipment operation in the agricultural and biosystems engineering laboratories, including but not limited to accident prevention and control procedures. Demonstrate the ability to follow safety and operational procedures in a lab setting and complete a safety test with 100 percent accuracy. (TN Reading 3; ARNR CS)		<ul style="list-style-type: none"> • HOSA: Biomedical Laboratory Science • SkillsUSA: Occupational Health and Safety • TSA: Biotechnology Design
3	Summarize the impact and patterns of environmental factors on plant biodiversity by examining research from academic journals, news articles, and government publications. Describe important characteristics of the relationships between plants and other organisms, including basic plant-human interactions, plant-animal interactions, and plant adaptation. (TN Reading 2; TN Writing 4; TN Biology I 2, 5; TN Biology II 2, 5; TN Ecology 6; TN Environmental Science 2)	<ul style="list-style-type: none"> • FFA: Environmental and Natural Resources 	

4	Evaluate, citing specific textual evidence, the physical and chemical properties of soils in an informative text. Perform technical procedures to classify soils by evaluating biotic and abiotic factors such as soil pH, texture, permeability, and water holding capacity. Interpret test results to identify deficiencies and formulate appropriate corrective actions. (TN Reading 3)	<ul style="list-style-type: none"> • FFA: Land Evaluation 	
5	Describing factors that influence soil quality and erosion. Assess the extent to which reasoning and evidence presented in news articles or case studies support the use of a specific soil conservation practice for maintaining healthy growing media for plants. (TN Reading 8; TN Writing 2, 7)	<ul style="list-style-type: none"> • FFA: Land Evaluation 	
6	Cite specific textual evidence for the analysis of land selection and conservation practices that ensure optimal productivity and stewardship. Identify factors that affect site selection for plant growth and draw evidence from multiple authoritative sources to appraise and justify management practices that ensure appropriate use of land resources. (TN Reading 1, 8; TN Writing 9; TN Ecology 6; TN Environmental Science 4)	<ul style="list-style-type: none"> • FFA: Environmental and Natural Resources, Forestry, Land Evaluation 	<ul style="list-style-type: none"> • HOSA: Researched Persuasive Speaking
7	Integrate print and digital sources to create a model depicting the parts of plant cells. Examine the structure and outline the functions of plant cell organelles. (TN Reading 2, 7; TN Biology I 1; TN Biology II 1, 7)	<ul style="list-style-type: none"> • FFA: Agriscience Fair 	<ul style="list-style-type: none"> • FBLA: Desktop Publishing
8	Analyze plant anatomy and physiology and relate key concepts to the processes and requirements involved in plant growth and productivity. (TN Biology II 6, 7)	<ul style="list-style-type: none"> • FFA: Floriculture, Nursery and Landscape 	
9	Analyze the nutrient requirements of plants and assess the importance of essential plant nutrients to plant growth and development. Use visual representations to illustrate the chemical and biological processes, including photosynthesis, that make nutrients available to plants for growth and maintenance. (TN Writing 4, 9; TN Biology II 7)	<ul style="list-style-type: none"> • FFA: Floriculture, Nursery and Landscape 	<ul style="list-style-type: none"> • HOSA: Biomedical Laboratory Science • TSA: Desktop Publishing, Promotional Graphics
10	Justify the use of fertilizers as a source of essential plant nutrients. Calculate fertilizer formulations and perform different methods of fertilizer application. (TN Reading 1, 3; TN Math N-Q)	<ul style="list-style-type: none"> • FFA: Floriculture, Nursery and Landscape 	
11	Research the nutritional factors that influence plant health to identify nutritional deficiencies and disorders. Compile observations to distinguish between the signs of nutrient deficiency in plants and defend recommendations for appropriate treatments. (TN Biology II 7)	<ul style="list-style-type: none"> • FFA: Floriculture, Nursery and Landscape 	<ul style="list-style-type: none"> • HOSA: Prepared Speaking • TSA: Prepared Presentation

12	Research the principles of disease and pest control to plant health, growth, and maintenance. Analyze the effects of different types of plant pests and diseases; prescribe methods for pest and disease prevention and treatment. (TN Reading 2)	<ul style="list-style-type: none"> • FFA: Floriculture, Nursery and Landscape 	<ul style="list-style-type: none"> • HOSA: Prepared Speaking, Researched Persuasive Speaking • TSA: Prepared Presentation
13	Demonstrate understanding of common classes of chemicals used for pest management. Gather and evaluate information regarding PPE (Personal Protective Equipment) for chemical application and demonstrate appropriate use of PPE. Create a checklist for safe storage and handling of pesticides. (TN Reading 3; TN Writing 4)	<ul style="list-style-type: none"> • FFA: Floriculture, Nursery and Landscape 	
14	Analyze the reproductive structures in plants and describe how they function in both sexual and asexual plant reproduction. (TN Biology II 7)	<ul style="list-style-type: none"> • FFA: Agriscience Fair 	<ul style="list-style-type: none"> • HOSA: Extemporaneous Writing, Prepared Speaking, Researched Persuasive Speaking
15	Investigate the role of DNA, heritability, and genetic applications in plant breeding and compose an informative essay that describes how mutation, gene flow, and adaption influence plant populations. Identify desirable traits in various plant species and predict the probable outcome of genetic crosses based on Mendel's laws. (TN Reading 3; TN Writing 2, 7; TN Biology I 4; TN Biology II 4)	<ul style="list-style-type: none"> • FFA: Agriscience Fair 	<ul style="list-style-type: none"> • TSA: Extemporaneous Presentation, Prepared Presentation
16	Distinguish the branches of science that influence plant biotechnology and summarize important historical achievements. Examine the role and importance of genetic principles to improving plant characteristics and perform basic plant DNA extraction procedures. (TN Reading 2, 3; TN Writing 4; TN Biology I 4; TN Biology II 4)	<ul style="list-style-type: none"> • FFA: Agriscience Fair 	<ul style="list-style-type: none"> • TSA: Biotechnology Design, Debating Technological Issues
17	Research current and emerging plant biotechnologies and construct an argumentative essay to support a claim supporting or opposing the use of a specific biotechnology in horticulture. Justify and debate ethical, legal, and economic issues surrounding plant biotechnology. (TN Reading 2, 8; TN Writing 1, 7)	<ul style="list-style-type: none"> • FFA: Agricultural Issues 	<ul style="list-style-type: none"> • FCCLA: Advocacy • HOSA: Biomedical Debate, Researched Persuasive Speaking
18	Evaluate the significance of hydroponics and aquaponics technology as related to sustainable practices and principles. Compare and contrast production systems and techniques utilized in the hydroponics and aquaponics fields, including structures and equipment, production methods, and common crops. (TN Ecology 6; TN Environmental Science 7)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	
19	Assess the functions, attributes, and desirable properties of soilless growing media. Write an informative essay to describe the major components of soilless media, identifying basic physical and chemical characteristics. (TN Reading 9; TN Writing 2)	<ul style="list-style-type: none"> • FFA: Floriculture, Nursery and Landscape 	<ul style="list-style-type: none"> • HOSA: Extemporaneous Writing, Prepared Speaking, Researched Persuasive Speaking • TSA: Extemporaneous Presentation, Prepared Presentation

20	Apply concepts learned in this course to visually identify common plant and animal species used for hydroponic and aquaponic production, and distinguish between their structural and physiological differences, as well as their specific production applications. (TN Reading 3; TN Biology II 6)	<ul style="list-style-type: none"> • FFA: Agricultural Technology and Maintenance 	
21	Examine the role that water chemistry plays in the development of water quality for plant production. Demonstrate the ability to perform common tests to evaluate water quality factors including pH, hardness, ammonium, nitrate, nitrite, dissolved oxygen, and ammonia levels. (TN Reading 3; TN Math N-Q)	<ul style="list-style-type: none"> • FFA: Floriculture 	
22	Analyze the effects of environmental conditions on aquatic plant and animal life. Adjust water quality factors by using quantitative reasoning and appropriate units to calculate proper formulations of chemicals based upon label directions. (TN Reading 3; TN Math N-Q; TN Biology I 2, TN Biology II 2)	<ul style="list-style-type: none"> • FFA: Agriscience Fair 	
ALL	CAN BE USED WITH ALL/MOST STANDARDS	<ul style="list-style-type: none"> • FFA: Floriculture, Nursery and Landscape 	<ul style="list-style-type: none"> • FCCLA: Illustrated Talk, Chapter in Review Display, Chapter in Review Portfolio • SkillsUSA: Career Pathways Showcase, Job Skills Demonstration A, Job Skills Demonstration O, Prepared Speech, Extemporaneous Speaking, Chapter Display