Plant Science

Course Description:

This course applies scientific principles to the management of plants. Topics covered include: integrated pest management, plant nutrition, crop production systems, internal anatomy and physiology, and basic biotechnology.

Course Code:

Program(s) of Study to which This Course Applies

- Plant Systems

Course Framework	Reference Standards	Academic Crosswalk
Standard 1. Students will understand the basic principles of integrated pest management.	NAS (PS.03.03)	[TBD by NDE]
Benchmark 1.1 Identify types of plant pests and diseases. Sample performance indicators: • Create a presentation showing common pests and diseases and their lifecycles. • Collect and identify samples of pests and diseases.	NAS (PS.03.03.01.a)	[TBD by NDE]
Benchmark 1.2 Examine the interrelationship among plants, pests, humans, and the environment. Sample performance indicators: • Diagram and explain the disease triangle. • Identify how plant environments can be altered.	OH (7.3.2)	[TBD by NDE]
Benchmark 1.3 Describe pest control strategies associated with integrated pest management.	NAS (PS.03.03.03.a)	[TBD by NDE]

Sample performance indicators: • Define and explain the differences between cultural, biological, chemical, and physical pest control strategies. • Outline the steps associated with integrated pest management. • Discuss the advantages of integrated pest management.		
Benchmark 1.4 Explain procedures for the safe handling, use and storage of pesticides. Sample performance indicators: • Recognize popular classes of chemicals used for pest management. • Understand state regulations for storage and safe handling of chemicals. • Select appropriate PPE (personal protective equipment) for chemical application.	NAS (PS.03.03.04.b)	[TBD by NDE]
Standard 2. Students will compare and contrast management practices and considerations necessary to provide an adequate nutritional environment for efficient plant production.	LS (12.5.5)	[TBD by NDE]
Benchmark 2.1 Identify the essential nutrients for plant growth and development and their major functions. Sample performance indicators: • List the macro and micro nutrients. • List the functions of the macro and micro nutrients.	NAS (PS.02.03.01.a)	[TBD by NDE]
Benchmark 2.2 Discuss the influence of pH and cation exchange capacity on the availability of nutrients. Sample performance indicators: • Articulate the pH scale. • Collect and test soil samples for pH. • Chart out ideal pH ranges for varying crops. • Relate pH to cation exchange capacity.	NAS (PS.02.03.02.a)	[TBD by NDE]
Benchmark 2.3 Identify fertilizer sources of essential plant nutrients, explain fertilizer formulations and describe different methods of fertilizer application. Sample performance indicators:	NAS (PS.02.03.04.a)	[TBD by NDE]

• Interpret a fertilizer formulation. • Take a field trip to a fertilizer plant to see the physical forms of fertilizer. • Identify the differing methods of fertilizer application.		
Benchmark 2.4 Describe nutrient deficiency symptoms and recognize environmental causes of nutrient deficiencies. Sample performance indicators: • Collect and label crop deficiency samples and make a fertilizer recommendation. • Compare and contrast the nutrient deficiencies with differing environmental factors.	NAS (PS.02.03.01.b)	[TBD by NDE]
Standard 3. Students will identify and discuss differing crop production systems in both the horticulture and agronomy sectors.		[TBD by NDE]
Benchmark 3.1 List and describe different agronomic cropping systems. Sample performance indicators: • Write a research paper addressing a given cropping system. • Diagram the differences that exist among cropping systems. • Produce a web explaining the relationships among cropping systems.		[TBD by NDE]
Benchmark 3.2 List and describe different horticultural cropping systems. Sample performance indicators: • Write a research paper addressing a given cropping system. • Diagram the differences that exist among cropping systems. • Produce a web explaining the relationships among cropping systems.		[TBD by NDE]
Benchmark 3.3 Rationalize cropping systems that will provide the best economic return in a given environment. Sample performance indicators: • Develop a budget for a given cropping system and defend that system to the class.		[TBD by NDE]
Standard 4. Students will understand the internal anatomy and physiology of plants.		[TBD by NDE]

Benchmark 4.1 Diagram a typical plant cell and identify plant cell organelles and their functions. Sample performance indicators: • Construct a plant cell using food products to represent the different organelles. • List the functions of the organelles.	NAS (PS.01.02.01.a)	[TBD by NDE]
Benchmark 4.2 Apply the knowledge of cell differentiation and the functions of the major types of cells to plant systems. Sample performance indicators: • Diagram root, leaf, and stem internal structure. • Relate plant disease to the how it negatively affects the function of the cells. • Differentiate between cells in the cambium and cells in the meristem.	NAS (PS.01.02.01.c)	[TBD by NDE]
Benchmark 4.3 Determine where photosynthesis, respiration, translocation, and transpiration occur and how they relate to one another. Sample performance indicators: • Diagram the carbon, water, and oxygen cycles as they relate to plants. • Explain why these processes are important to plant growth. • Experiment with growing plants in different environments and discuss how the environment has affected these basic processes.	NAS (PS.01.02)	[TBD by NDE]
Benchmark 4.4 Identify the plant responses to plant growth regulators and different forms of tropism. Sample performance indicators: • List and define the different types of tropisms. • Grow plants using different plant growth regulators and report results.	NAS (PS.01.03.04.b)	[TBD by NDE]
Standard 5. Students will recognize where crop domestication and genetic improvement have increased plant productivity.		[TBD by NDE]
Benchmark 5.1 Identify two methods of genetic improvement in crops. Sample performance indicators: • Create a presentation on a genetic improvement in a specific crop.		

• List characteristics that breeders selected for when plants where first domesticated.		
Benchmark 5.2 Outline the genetic engineering process. Sample performance indicators: • List in proper order, the steps in genetic engineering. • Create a fictional genetically engineered organism and form a poster to explain the process.		[TBD by NDE]

Reference Standards Sources

- OH = Agriculture and Environmental Systems Career Field Technical Content Standards. September 2008. Ohio Board of Regents, Ohio College Tech Prep, Ohio Department of Education.
- CA = Ag and Natural Resources Industry Sector. California.
- TX = Agriculture, Food and Natural Resources. 2009. Texas Education Agency
- NAS = National Agriculture Standards
- LS = Links to Standards Reference

Other Information

Suggestions for innovative teaching and learning strategies:	• Range Camps • Field Trips • Ag Trade Shows
Related assessments:	•
Extended learning opportunities:	• Land Judging • FFA - Natural Resource Speaking • FFA - Agronomy Career Development Event • Range Judging • Envirothon • SAE Programs • 4-H Projects