

## Agronomic Science Capstone

### Course Description

This course provides the study of plant physiology and morphology and its relationship to growth, development and reproduction of crop and forage plants in the global environment. Topics include: seed identification, testing and grain grading. Identification of agronomic crops and major weeds in crop production and harvesting and handling will be emphasized. Aligns with NCTA Agr 1103 Crop Science.

### Course Code:

### Program(s) of Study to which This Course Applies

- Plant Systems

Course Framework	Reference Standards	Academic Crosswalk
<b>Standard 1. Students will develop a global understanding of the food, feed, and fiber system.</b>	NCTA (AGR 1103)	[TBD by NDE]
Benchmark 1.1 Explore potential career paths in crop production.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Write a report about a career in the crop production field.</li> <li>Interview a professional in this career area.</li> <li>Visit 5 crop production professionals at an Ag trade show.</li> </ul>	LS (12.5.2)	[TBD by NDE]
Benchmark 1.2 Examine the foundation and progression of crop production systems.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Design a timeline showing the major events in crop production history.</li> <li>Research an event in history and its affect on the progression of crop yields.</li> <li>Explore how a crop variety has progressed over the years.</li> </ul>	NCTA (AGR 1103)	[TBD by NDE]

<p>Benchmark 1.3 Compare and contrast global crop production methods.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Identify limitations to crop production globally.</li> <li>Develop a PowerPoint on a given country's crop production methods.</li> </ul>	NCTA (AGR 1103)	[TBD by NDE]
<p>Benchmark 1.4 Identify crop production regions and uses of major and minor crops.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Design a world map showing crops produced.</li> <li>Choose a crop and research its potential end uses.</li> <li>Research an alternative or specialty crop.</li> </ul>	NCTA (AGR 1103)	[TBD by NDE]
<p>Benchmark 1.5 Consider the challenges of feeding the world.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Research a government policy that affects food distribution.</li> <li>Identify environmental limitations to food production.</li> </ul>	LS (12.5.7)	[TBD by NDE]
<p>Benchmark 1.6 Evaluate differing crop marketing methods.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>List advantages and disadvantages of 5 methods of marketing.</li> <li>Take a field trip to a local coop, farm market, or board of trade.</li> </ul>	LS (AE 12.1.12) LS (12.5.10)	[TBD by NDE]
<p><b>Standard 2. Students will develop and implement an integrated pest management plan focusing on insects, weeds, and diseases that affect crop production.</b></p>	NAS (PS.03.02)	[TBD by NDE]
<p>Benchmark 2.1 Choose and apply pesticides economically and safely.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Develop a chart listing costs of application of pesticides per acre.</li> <li>Calculate the economic threshold of a given pest.</li> <li>Research the toxicity of major pesticides.</li> <li>Read and interpret a pesticide label.</li> </ul>	NAS (PS.03.03.03b)	[TBD by NDE]
<p>Benchmark 2.2 Identify major local weeds, insect pests and infectious and noninfectious diseases.</p>	NAS (PS.03.03.01.b)	[TBD by NDE]

<p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Collect and identify 10 weeds.</li> <li>• Identify and display 5 beneficial insects and 5 insect pests.</li> <li>• Research a crop and list its major weed, insect, and disease pests.</li> </ul>		
<p>Benchmark 2.3 Integrate physical, biological, and cultural pest control strategies to minimize pesticide use.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• List 5 practices that would fall under physical, biological, and cultural control strategies.</li> <li>• Develop an integrated pest management plan for a chosen crop.</li> </ul>	NAS (03.03.03.a)	[TBD by NDE]
<p>Benchmark 2.4 Design and implement a crop scouting program based on environmental conditions and life cycles.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Diagram the life-cycle of a given pest.</li> <li>• Describe the difference between complete and incomplete metamorphosis.</li> <li>• Identify the ideal window of pest control.</li> <li>• Develop a chart comparing plant stage of growth, environmental factors, and pests.</li> </ul>	NAS (PS.03.03.01.c) NAS (PS.03.03.02.b)	[TBD by NDE]
<p><b>Standard 3. Students will utilize resources efficiently and sustainably for crop production.</b></p>	NAS (PS.03.04)	[TBD by NDE]
<p>Benchmark 3.1 Implement appropriate tillage and residue management strategies to sustain soil quality.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• List the advantages and disadvantages of the different tillage methods.</li> <li>• Collect soils samples from a no-till field and a conventional till field and compare results.</li> <li>• Measure and estimate crop residue levels.</li> </ul>	LS (12.5.4)	[TBD by NDE]
<p>Benchmark 3.2 Develop and implement a nutrient management plan for crop production.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Collect a soil sample for soil testing and analyze the results.</li> <li>• Based on soil analysis, develop a fertilizer plan for a field.</li> </ul>	NAS (PS.02.03)	[TBD by NDE]

<ul style="list-style-type: none"> <li>Calculate fertilizer use efficiency of different application methods.</li> </ul>		
<p>Benchmark 3.3 Implement irrigation and crop management strategies to efficiently utilize water.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Collect a soil sample and determine soil moisture content.</li> <li>Research soil moisture sensors.</li> <li>Compare the efficiency of different irrigation methods.</li> <li>Develop an irrigation schedule based on crop water use.</li> </ul>	LS (12.5.4)	[TBD by NDE]
<p>Benchmark 3.4 Incorporate crop rotation, cover crops, and other cropping practices to sustain resources.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Research the benefits of cover crops.</li> <li>Debate the advantages and disadvantages of differing crop rotation systems.</li> <li>Research the benefits of two-crop sequencing over continuous crop.</li> </ul>	LS (12.5.6) LS (12.5.9)	[TBD by NDE]
<p><b>Standard 4. Students will apply knowledge of plant classification, plant anatomy, and plant physiology to the production and management of plants.</b></p>	NAS (PS.01)	[TBD by NDE]
<p>Benchmark 4.1 Recognize characteristics of quality seeds such as mechanical damage, viability and grade.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Collect grain samples and analyze for grade.</li> <li>Perform germination tests to determine seed viability.</li> </ul>	TX (130.21 - 13B)	[TBD by NDE]
<p>Benchmark 4.2 Link crop varieties and classes to crop utilization.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Chart the 6 major classes of wheat in terms of use, region of production, and season of growth.</li> <li>Research how corn grain has been manipulated to create higher quality food, feed, and ethanol.</li> </ul>	NAS (PS.01)	[TBD by NDE]
<p>Benchmark 4.3 Connecting crop growth and development to planting rate, plant populations, spacing, planting date, harvest losses, and environmental conditions.</p>	OH (7.5.5)	[TBD by NDE]

<p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Take plant population counts in 10 locations.</li> <li>• Calculate harvest loss.</li> <li>• Describe how planting rate and date influences crop yield components.</li> <li>• Calculate growing degree days.</li> </ul>		
<p>Benchmark 4.4 Evaluate how biotechnology has impacted crop production.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• List the advantages and disadvantages of Bt corn and Round-Up Ready soybeans.</li> <li>• Develop a scenario of a new biotechnology technique that could be implemented to solve a current problem.</li> <li>• Develop a refuge system for Bt corn.</li> </ul>	<p>CA (G11.0) LS (12.5.8)</p>	<p>[TBD by NDE]</p>
<p><b>Standard 5. Students will efficiently utilize technology and equipment for crop production.</b></p>	<p>OH (7.5.6) LS (12.5.10) NAS (PS.03.05)</p>	<p>[TBD by NDE]</p>
<p>Benchmark 5.1 Evaluate and implement precision agricultural techniques in crop production.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Research 2 precision ag techniques that exist in crop production.</li> <li>• Budget the cost effectiveness of implementing precision ag techniques.</li> <li>• Define global positioning systems, geographic information systems, and variable rate application.</li> <li>• Visit a local implement dealer to view precision ag equipment.</li> </ul>	<p>NAS (PS.02.03.04.c)</p>	<p>[TBD by NDE]</p>
<p>Benchmark 5.2 Identify harvesting methods, harvesting equipment, and proper storage facilities for crop products.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>• Create a poster showing different harvesting equipment for a given crop.</li> <li>• Attend an ag expo and create a photographic poster of harvesting equipment.</li> <li>• List the factors that affect storage conditions.</li> </ul>	<p>NAS (PS.03.05.01.a) NAS (PS.03.05.03.a)</p>	<p>[TBD by NDE]</p>
<p>Benchmark 5.3 Demonstrate proper planting procedures, equipment selection, and post planting care.</p>	<p>NAS (PS.03.02.03.a)</p>	<p>[TBD by NDE]</p>

<u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>• Calibrate correct seeding rate on a planter.</li> <li>• Calculate the cost efficiency of equipment size and farm size.</li> <li>• Identify proper conditions for seedling growth.</li> </ul>		
Benchmark 5.4 Select and calibrate equipment for efficient chemical application.		
<u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>• Calibrate a sprayer.</li> <li>• Attend a field trip to a local coop and discuss chemical application.</li> <li>• Evaluate 5 nozzles for broadcast spray application.</li> </ul>	OH (7.3.6) NAS (PS.03.03) OH (7.3.5)	[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:	<ul style="list-style-type: none"> <li>• Agriculture Trade Shows</li> <li>• Job Shadowing</li> <li>• Internships/Work Experience</li> </ul>
Related assessments:	<ul style="list-style-type: none"> <li>• Nebraska Commercial Chemical Applicators License</li> <li>• Nebraska Chemigation Applicator License</li> </ul>
Extended learning opportunities:	<ul style="list-style-type: none"> <li>• Agronomy CDE</li> <li>• Crop Production SAE</li> </ul>