

# Precision Agriculture


This course is designed to employ appropriate techniques to demonstrate application of Geographic Information System/Global Positioning System (GIS/GPS) system principles, to use computer applications to produce maps that reflect surveying and mapping principles, and allow the student to select an area of personal expertise to demonstrate knowledge of end applications. Emphasis is placed on concepts, principles, equipment, techniques, and application. Skills in communication, problem solving, mathematics, and computer usage are reinforced in this course. Supervised agricultural experience programs and the FFA leadership activities are integral components of the course and provide many opportunities for practical application of instructional competencies.


*Prerequisite: Agriscience II*


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Precision Agriculture		Content Guideline																		
<b>Louisiana Agricultural Education Related Content Standards</b>		Intro to Precision Agriculture	Intro to Global Positioning System	Accuracy /Error	Differential Correction	Uses of GPS	Introduction to GIS	Spatial Data	Soil Sampling	Yield Monitoring	Digital Imagery	Products of Precision Agric.	Agricultural Tech. Careers							
		<p><b>STRAND: Agricultural Literacy K-12</b>  <b>Standard: All students will become aware of the characteristics and components of the food and fiber systems.</b></p>																		
a. Agricultural awareness grades K-4																				
b. Agricultural literacy grades 5-8																				
c. Agricultural literacy grades 9-12		•	•	•	•	•	•	•	•	•	•	•	•							
<p><b>STRAND: Personal Development</b>  <b>Standard: AgEd/FFA students will develop the necessary interpersonal and communication skills to obtain a job and work effectively and safely in an interactive work environment.</b></p>																				
a. Agricultural communication		•	•	•	•	•	•	•	•	•	•	•	•							
b. Team work in agriculture		•	•	•	•	•	•	•	•	•	•	•	•							
c. Careers in agriculture		•	•	•	•	•	•	•	•	•	•	•	•							
<p><b>STRAND: Agribusiness</b>  <b>Standard: AgEd/FFA students will understand the concept of agricultural marketing, management, finance, and entrepreneurship.</b></p>																				
a. Production systems		•								•		•	•							
b. Selections from various choices																				
c. Factors that make employees successful																				
d. Agricultural marketing sales and services													•							
e. Economics of production																				
f. Develop a business plan																				

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	<b>STRAND: Plant Systems</b> <b>Standard: AgEd/FFA students will understand the concepts and principles of plant science.</b>																	
a. Internal processes affecting plant growth and reproduction								•	•									
b. External environmental factors affecting plant growth and reproduction								•	•									
c. Soil fertility								•	•									
d. Plant production								•	•									
e. Landscaping and floriculture								•										
f. Crops of Louisiana								•										
g. Horticultural crops of Louisiana								•										
h. Agribusiness relating to crop production																		
<b>STRAND: Environmental Management</b> <b>Standard: AgEd/FFA students will develop an understanding of the interrelationship between people, agriculture, and the environment.</b>																		
a. Universal impact of forestry	•	•			•	•	•			•								
b. Wildlife management and conservation	•	•			•	•	•			•								
c. Environmental quality					•													

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	<b>STRAND: Agriscience Technology</b> <b>Standard: AgEd/FFA students will demonstrate technical skills that reflect successful business and industry practices.</b>																	
a. Agriculture power and energy	•	•			•			•										
b. Energy sources in agriculture	•	•			•			•										
c. Mathematics in agriscience technology	•	•	•	•	•	•		•										
d. Agriscience welding technology																		
e. Agricultural structures and facilities	•	•			•													

# Precision Agriculture Content Guideline

(The student will be able to. . .)

## Unit One

### Introduction to Precision Agriculture

1. Define *precision agriculture*.
2. Recognize the tools of precision agriculture.
3. Analyze different resources about precision agriculture.
4. Analyze the many acronyms associated with precision agriculture.
5. Outline current uses of precision agriculture technology.

## Unit Two

### Introduction to Global Positioning System (GPS)

1. Provide a physical description of GPS satellites and their orbits.
2. Explore the components of a GPS receiver.
3. Perform a simple operation on a GPS receiver after proper instruction.
4. Demonstrate to the class how to use a GPS receiver.
5. Locate and plot coordinates on a map.
6. Find and plot five points on the school campus.

## Unit Three

### Accuracy/Errors

1. Recognize the amount of errors in GPS.
2. Describe how errors affect the use of GPS.
3. Interpret agricultural examples of errors in GPS.
4. Research different examples of typical errors found in a GPS.
5. Estimate three GPS error examples.

## Unit Four

### Differential Correction

1. Explain the need for correction of GPS positioning.
2. Describe the availability of differential error correction.
3. Summarize the description of differential correction.
4. Troubleshoot problems in using the GPS.

## **Unit Five**

### **Uses of GPS**

1. Describe GPS location.
2. Describe GPS navigation.
3. Describe GPS data logging.
4. Identify a value of each of the above uses of GPS.
5. Demonstrate on a map the location of a longitude and latitude point.
6. Create a set of data plotting campus trees, sidewalks, etc., with a GPS receiver.

## **Unit Six**

### **Introduction to Geographic Information System (GIS)**

1. Analyze GIS
2. Differentiate mapping and GIS.
3. Evaluate maps and data and their use when combined in computer software.
4. Analyze Arc Explorer software and its uses in GIS.
5. Explore local cities and landmarks using the computer.

## **Unit Seven**

### **Spatial Data**

1. Define spatial features and attributes.
2. Identify spatial data.
3. Create a data dictionary.
4. Analyze spatial feature and data that can be mapped.

## **Unit Eight**

### **Soil Sampling**

1. Divide a field into grids for sampling.
2. Discuss the pros and cons of grid sampling.
3. Explore alternatives to grid sampling.
4. Predict the results of a particular grid sample.
5. Evaluate completed samples of soil grids.

## **Unit Nine**

### **Yield Monitoring**

1. Differentiate between yield monitoring and GPS yield mapping.
2. Analyze the components of a yield mapping system.
3. Discuss the value and concerns of a yield map.
4. Observe a farmer who uses yield monitoring and mapping.
5. Explain the purpose of yield monitoring and mapping.

## **Unit Ten**

### **Digital Imagery**

1. Define and discuss *digital imagery*.
2. Analyze the types and variations of digital imagery.
3. Define and discuss *remote imagery*.
4. Compare digital images to topographic maps.
5. Research images on [www.research.umhc.edu](http://www.research.umhc.edu) website for familiarity.
6. Apply digital imagery to crop management.

## **Unit Eleven**

### **Products of Precision Agriculture**

1. Recognize relationships between crop production factors.
2. Define and discuss *variable rate technology*.
3. Evaluate value and concerns of variable rate technology.
4. Discuss the final objective and goals of modern precision agriculture.
5. Evaluate methods of record keeping in precision agriculture.
6. Interpret data in variable rate application in precision agriculture.
7. Interpret maps and discuss potential problems and solutions.

## **Unit Twelve**

### **Agricultural Technology Careers**

1. Identify career areas in GPS/GIS technology.
2. Predict the areas in which GIS/GPS technology will be used in agriculture in the next five years.
3. Create a list of skills needed to fill the jobs in GPS/GIS careers.
4. Research and present a report on five agricultural technology careers.
5. Synthesize the importance and value of related skills for careers using applications of GPS/GIS.

# Resources

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JD Mapp (software demo of yield map)  
Contact local John Deere dealer

Lowrance Electronics –Telephone: (800) 324-4743 (GPS Handheld receiver)

The High School Agricultural Science Precision Agriculture Curriculum  
Precision Agriculture Education Network (PrAEN)

Terry Brase, Project Director  
Kirkwood Community College  
6301 Kirkwood Blvd  
Cedar Rapids, IA 52406  
(319) 398-5458      [tbrase@kirkwood.cc.ia.us](mailto:tbrase@kirkwood.cc.ia.us)

United States Geological Survey (USGS) Topographical Maps  
1-800-USA-MAPS (press 2)

## Internet Sites

[www.agriculture.com](http://www.agriculture.com) (2003). Successful Farming's Ag Innovator Website.

[www.deere.com/aboutus/pub/jdpub/](http://www.deere.com/aboutus/pub/jdpub/) (2003). John Deere Publishing: *The Precision Farming Guide for Agriculturalists*

[www.delorme.com/atlas/atlasgaz/htm](http://www.delorme.com/atlas/atlasgaz/htm) (2003). Delorme Gazetteer.

[www.eomonline.com/index4.htm](http://www.eomonline.com/index4.htm) (2003). Modern Agriculture.

[www.esri.com/company/free.html](http://www.esri.com/company/free.html) (2003). Arc Explorer (Introductory GIS software).

[www.esri.com/industries/k-12/material.html](http://www.esri.com/industries/k-12/material.html) (2003). GIS videos and other materials

[www.gpsworld.com](http://www.gpsworld.com) (2003). GPS World.

[www.precisionag.com](http://www.precisionag.com) (2003). Precision Ag. Illustrated (Video sources).

[www.shopping.discovery.com](http://www.shopping.discovery.com) (2003). Eye in the Sky (#716035) Discovery Channel Video.