

# Site-Specific Crop Management



**UNIVERSITY OF NEBRASKA - LINCOLN**  
*Agronomy and Horticulture*  
*Biological Systems Engineering*

**Instructors:**

**Dr. Richard B. Ferguson**  
**Dr. Joe D. Luck**

**Fall 2012**

**UNIVERSITY OF NEBRASKA - LINCOLN**  
**Agronomy and Horticulture & Biological Systems Engineering Departments**

**Course Description**

AGRO/MSYM/AGEN 431. Site-Specific Crop Management (3 credit hours; 2 hours lecture and 3 hours laboratory). Prerequisites: AGRO/SOIL 153 and AGRO 204. The course is limited to senior level only or by permission.

**Time and Location**

All meetings will be held in 264 Keim Hall, or as announced. Class schedule: Tuesday 1:00-4:50 pm and Thursday 1:00-1:50 pm.

**Purpose of the Course**

The course overviews principles and applications of precision agriculture. It focuses on hands-on experience using hardware/software and information management systems for mastering the essential skills to adopt site-specific crop management.

**Course Objectives**

1. Use global positioning system (GPS) receivers and understand the meaning of geo-referenced data.
2. Use geographic information system (GIS) software to accomplish spatial data management.
3. Work with yield monitoring and other relevant data acquisition equipment.
4. Identify major sources of errors and develop proper data handling strategies.
5. Determine potential uses of remote sensing and automated on-the-go measurement systems.
6. Understand the principles of variable rate application of seed, water, fertilizer, lime, and pesticides.
7. Integrate yield and soil nutrient maps with other geo-referenced data to develop effective site-specific crop management programs.
8. Apply a systems approach combined with common sense to deduct causes of spatial variability and develop corresponding recommendations.
9. Identify potential advantages (both economic and environmental) and current limitations of precision agriculture.

**Instructors**

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**Graduate Research Assistant**

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**Class Resources**

Course materials and grades will be posted on Blackboard.

**Calculators and Computers**

A calculator is required during tests and selected classroom exercises. You are required to use computers for all your projects and assignments. The ability to effectively use word processing (MS Word), spreadsheet (Excel) and slide presentation (PowerPoint) software is required. Familiarity with any type of GIS software will be beneficial.

**Building Access:**

Chase hall and computer lab (CHA 114) are open during business hours. A special request can be made to access the building and lab during week-ends and evening hours. In case another class occupies most of the computers in CHA 114, computers in CHA 114A should be available.

**Course Administration**

1. **Lectures:** Two lectures per week will be devoted to selected topics on site-specific crop management.
2. **Labs:** One lab per week will be devoted to hands-on use of equipment and software, and will include several field trips.
3. **Exams:** Two tests will be given, a mid-term and an end-of-semester exam. Both exams will cover material specific to the preceding section of the course.

4. **Evaluation:**

- A. UNL policies for Pass/No Pass, Incompletes and Withdrawals apply.
- B. Your final grade will be based upon your accumulated point total as a percentage of a possible 500 points (based on the Grading System in the UNL Undergraduate Bulletin):

A+ 98 - 100%	B+ 88 - 89%	C+ 78 - 79%	D+ 68 - 69%	F 0 - 60%
A 92 - 97%	B 82 - 87%	C 72 - 77%	D 62 - 67%	
A- 90 - 91%	B- 80 - 81%	C- 70 - 71%	D- 60 - 61%	

- C. Assignments are due at the start of the class period on the assigned date. A substantial penalty (up to 100%) for late assignments and frequent absences will be applied. No points will be given for omitted assignments. Up to 20 bonus points may be given for active participation in class discussions. Additional bonus points may be provided through the semester as deemed appropriate by the instructor.

D. Allocation of points:

<b>2 EXAMS</b>	<b>200</b>
<b>2 PROJECTS</b>	<b>150</b>
<b>5 ASSIGNMENTS</b>	<b>150</b>
<b>TOTAL</b>	<b>500</b>

E. List of planned assignments:

<b>Activity</b>	<b>Topic</b>	<b>Due Date</b>	<b>Points</b>
Assignment 1	Handheld GPS Practice	August 30, 2012	30
Assignment 2	GIS – Accessing Public Data	September 13, 2012	30
Exam 1	Course Content to Date	September 20, 2012	100
Assignment 3	GIS – Yield Data Processing	October 4, 2012	30
Project 1	Project 1 Presentation & Report	October 9 & 11, 2012	70
Assignment 4	GIS – Overlaying Data Layers	October 25, 2012	30
Assignment 5	GIS – Prescription Maps	November 15, 2012	30
Project 2	Project 2 Presentation & Report	Nov. 29, Dec. 4, 2012	80
Exam 2	Course Content since Exam 1	December 11, 2012	100

- 5. **Academic Honesty.** The Code of Conduct published in the UNL Student Handbook concerning academic honesty applies.
- 6. **Students with Disabilities** are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.

## Site-Specific Crop Management Class Schedule 2012

<i>Date</i>	<i>Lecture Topic</i>	<i>Presenter</i>	<i>Lab Topic</i>	<i>Lab Presenter</i>
21-Aug	Introduction/Scope	Ferguson	GPS Introduction	Ferguson/Luck
23-Aug	GPS & Coordinate Systems	Luck		
28-Aug	Geographic Information Systems	Luck	Accessing Public Data	Ferguson
30-Aug	Soil Sampling & Analysis	Ferguson		
4-Sep	Soil Sensors	Ferguson	Introduction to GIS	Ferguson
6-Sep	Spatial Data Management	Ferguson		
11-Sep	Husker Harvest Days		Field Trip	Ferguson/Luck
13-Sep	Principles of Yield Mapping	Luck		
18-Sep	Guidance Technology	Luck	Yield Data Processing	Luck
20-Sep	Exam I			
25-Sep	Variable Rate Technology I	Luck	Yield Mapping - ARDC	Ferguson/Luck
27-Sep	Section Control	Luck		
2-Oct	Field Variability	Ferguson	Soil Data Processing	Ferguson
4-Oct	Site-Specific Nutrient Management I	Ferguson		
9-Oct	Project 1 Reports		Soil Sensing - ARDC	Ferguson/Luck
11-Oct	Project 1 Reports			
16-Oct	Fall Break			
18-Oct	Site-Specific Nutrient Management II	Ferguson		
23-Oct	Precision Ag Profitability	Luck	Profitability	Luck
25-Oct	Telemetry or Field Data Analysis	Luck		
30-Oct	Variable Rate Technology II	Luck	Field Data Analysis	Luck
1-Nov	Canopy Sensors	Shanahan		
6-Nov	Remote Sensing I	Schepers	Prescription Maps	Luck
8-Nov	Remote Sensing II/UAVs	Ferguson		
13-Nov	Precision Water Management	Martin	Work on Project 2	
15-Nov	Adoption of Precision Agriculture	Varner		
20-Nov	Practitioner Panel			
22-Nov	Thanksgiving			
27-Nov	Precision Pest Management	???????	Work on Project 2	
29-Nov	Project 2 Reports			
4-Dec	Project 2 Reports			
6-Dec	Future Directions of Precision Agriculture	Ferguson		
11-Dec	Exam II			

*Green shading = field activities*

*Yellow shading = exams*

*Blue shading = reporting; class meeting location may change*

*Purple shading = class does not meet*