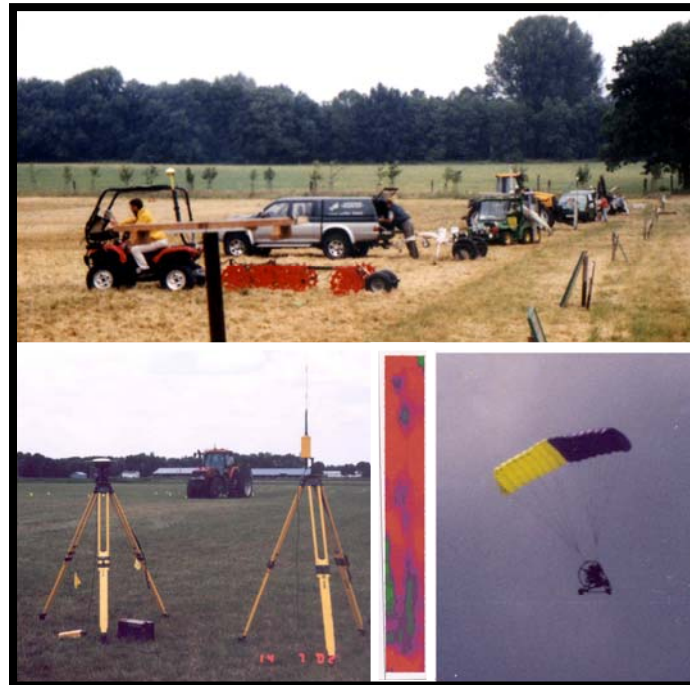


Site-Specific Crop Management



UNIVERSITY OF NEBRASKA - LINCOLN
Biological Systems Engineering
Agronomy and Horticulture

Fall 2009

Instructors:

Dr. Viacheslav I. Adamchuk

Dr. Richard B. Ferguson

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

Course Description

AGRO/MSYM/AGEN 431. Site-Specific Crop Management (3 credit hours; 2 hours lectures 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 148 Chase 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 was developed to overview the principles and concepts of precision agriculture. It focuses on hands-on experience using hardware/software and information management systems for mastering the essential steps when adopting 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 systems (GIS) software to accomplish primary spatial data management tasks
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 usage of remote sensing and automated on-the-go measurement systems
6. Understand principles of variable rate application of seeds, water, fertilizers, lime, and pesticides
7. Integrate yield and soil nutrient maps with other geo-referenced data to develop an effective site-specific crop management program
8. Apply system approach and 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

Viacheslav I. Adamchuk, 203 Chase Hall, 472-8431, vadamchuk2@unl.edu
Richard B. Ferguson, 377K Plant Science Hall, 472-1144, rferguson1@unl.edu
Monte A. Shomaker, 212.1 Chase Hall, 472-1642, mshomaker2@unl.edu – secretary

Class Web Page

Grades and other sensitive materials will be posted on Blackboard.

Past tests, tutorials, and data sets can be obtained from http://bse.unl.edu/adamchuk/class_ssm.

To access the training data sets, use “sscm” username and “_____” password.

To access Manifold tutorial files, use “paw” username and “_____” password

Calculators and Computers

An electronic hand calculator is required during tests and selected classroom exercises. You are required to use computers for all your projects and assignments. 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 has to be made in person to obtain access 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 relevant to system analysis of site-specific crop management techniques.
2. **Labs:** One lab per week will be devoted to hands-on use of equipment and software, and include several field trips.
3. **Tests:** Two tests will be given, a mid-term and an end-of-semester. The first test will address technology aspects of site-specific crop managements; the second test will evaluate familiarity with various application approaches.
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, page 14):

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. The assignments are due the beginning of class. A substantial (up to 100%) penalty 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.

D. Allocation of points:

2 TESTS	200
2 PROJECTS	150
7 ASSIGNMENTS	150
TOTAL	500

E. List of tentative assignments:

Assignment	Topic	Tentative Due Date	Points
Assignment 1	Handheld GPS Practice	September 10, 2009	30
Assignment 2	Manifold GIS Tutorial Lesson 2	September 22, 2009	10
Assignment 3	Manifold GIS Tutorial Lesson 3	October 06, 2009	10
Assignment 4	Manifold GIS Tutorial Lesson 4	October 15, 2009	10
Test 1	First Test	October 15, 2009	100
Project 1	Project 1 Report	October 27, 2009	70
Assignment 5	Manifold GIS Tutorial Lesson 5	November 10, 2009	10
Assignment 6	Field Practice	November 17, 2009	60
Assignment 7	Profitability Practice	November 24, 2009	20
Project 2	Term Project	December 08, 2009	80
Test 2	Second Test	December 15, 2009	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.

AGRO / MSYM / AGEN 431 Class Schedule (Fall 2009)

Week	Class	Date	Topic	Location	Instructor
1	Lec (T)	08/25/09	Course Introduction	CHA 148	Ferguson
1	Lab	08/25/09	Publicly-Available Data (Lesson 1)	CHA 114	Ferguson/ Dhillon
1	Lec (R)	08/27/09	Scope of Precision Agriculture	CHA 148	Ferguson
2	Lec (T)	09/01/09	GPS and Geographic Coordinates	CHA 148	Adamchuk
2	Lab	09/01/09	Handheld GPS Practice	East Campus	Adamchuk/Ferguson
2	Lec (R)	09/03/09	GPS and Geographic Coordinates	CHA 148	Adamchuk
3	Lec (T)	09/08/09	Geographic Information Systems	CHA 148	Adamchuk
3	Lab	09/08/09	Introduction to GIS (Lesson 2)	CHA 114	Adamchuk/Pan
3	Lec (R)	09/10/09	Agricultural Vehicle Guidance	CHA 148	Adamchuk
4	Lab	09/15/09	Husker Harvest Days	HHD Site	Adamchuk/Ferguson
4	Lec (R)	09/17/09	Principles of Yield Mapping	CHA 148	Adamchuk
5	Lec (T)	09/22/09	Spatial Data Management	CHA 148	Ferguson
5	Lab	09/22/09	Yield Data Processing (Lesson 3)	CHA 114	Ferguson/Pan
5	Lec (R)	09/24/09	Planning Field Practices	CHA 148	Ferguson
6	Lab	09/29/09	Yield Mapping Field Practice	ARDC	Schroeder/Luedtke
6	Lec (R)	10/01/09	Soil Sampling and Analysis	CHA 148	Ferguson
7	Lec (T)	10/06/09	On-the-Go Soil Sensors	CHA 148	Adamchuk
7	Lab	10/06/09	Soil Data Processing (Lesson 4)	CHA 114	Adamchuk/Dhillon
7	Lec (R)	10/08/09	On-the-Go Soil Sensors	CHA 148	Adamchuk
8	Lab	10/13/09	Soil Sensing Field Practice	ARDC	Adamchuk/Ferguson
8	Lec (R)	10/15/09	First Test	CHA 148	Adamchuk
9		10/20/09	Fall Semester Break	- - -	
9	Lec (R)	10/22/09	System Approach to Management	CHA 148	Jasa
10	Lec (T)	10/27/09	Understanding Field Variability	CHA 148	Ferguson
10	Lab	10/27/09	Project 1 Report	ECU	Ferguson/Adamchuk
10	Lec (R)	10/29/09	Site-Specific Nutrients Management	CHA 148	Ferguson
11	Lec (T)	11/03/09	Variable Rate Technology	CHA 148	Adamchuk
11	Lab	11/03/09	Prescription Maps (Lesson 5)	CHA 114	Adamchuk/Pan
11	Lec (R)	11/05/09	Aerial Field Imagery	CHA 148	Adamchuk
12	Lec (T)	11/10/09	Principles of Remote Sensing	CHA 148	Perk
12	Lab	11/10/09	Field Practice Data Analysis	CHA 114	Adamchuk/Ferguson
12	Lec (R)	11/12/09	Plant Sensors and N-Management	CHA 148	Shanahan
13	Lec (T)	11/17/09	Precision Agriculture Profitability	CHA 148	Adamchuk
13	Lab	11/17/09	Profitability Practice	CHA 114	Adamchuk/Ferguson
13	Lec (R)	11/19/09	Site-Specific Seed Management	CHA 148	Ferguson
14	Lec (T)	11/24/09	Site-Specific Water Management	CHA 148	Martin
14	Lab	11/24/09	Panel Discussion	ECU	Ferguson/Adamchuk
14		11/26/09	Thanksgiving Vacation	- - -	
15	Lec (T)	12/01/09	Site-Specific Weed Management	CHA 148	Adamchuk/Meyer
15	Lab	12/01/09	Project 2 Practice	CHA 114	Adamchuk
15	Lec (R)	12/03/09	Examples of Telemetry	CHA 148	Ferguson
16	Lec (T)	12/08/09	Future of Precision Agriculture	CHA 148	Adamchuk
16	Lab	12/08/09	Project 2 Report	ECU	Ferguson/Adamchuk
16	Lec (R)	12/10/09	Course Review	CHA 148	Adamchuk
17		12/15/09	Second Test	CHA 148	