AOM4434 | Precision Agriculture

Spring, 2026
Online, 3 credits

Dr. Won Suk "Daniel" Lee

Frazier Rogers Hall, Room 207
(352) 294-6721
wslee@ufl.edu
Office hours (optional):
- Odd week: Monday 3:00-3:30 pm
- Even week: Tuesday, 3:00-3:30 pm
- Or by appointment

https://ufl.zoom.us/j/95392002049?pwd=7mIsYmYddpJuNbQaCqrUS0iR0j6kdS.1

Mr. Kyle Kalarchian

Frazier Rogers Hall, Room 143
(954) 397-8810
kkalarchian@ufl.edu
https://ufl.zoom.us/j/6501019068

Course Description

Principles and applications of technologies supporting precision farming and planning for natural resource data management. Global positioning system (GPS), yield monitoring and mapping, remote sensing, geographic information system (GIS), variable rate technologies (VRT), data layering of independent variables, Internet information access, and computer software for management.

AI Credit

Enable-AI: Support AI through related knowledge and skill development, such as programming or statistics. AI course content is 10-49%.

This course accomplishes the AI Designation objective of the subject areas listed above. This course explains the definitions of AI, machine learning, and deep learning. It also explores various AI applications in precision agriculture.

Course Prerequisites

- Junior standing.
- This course is intended for students with upper-division standing in the Colleges of Agricultural and Life Science, Natural Resources and Environment, and Engineering. In addition to having Junior standing, students should be experienced in using MS Windows, a web browser, a word processor, a presentation tool, and a spreadsheet.

Course Learning Objectives

This course covers information and *state-of-the-art* technologies used for precision farming and their applications. In this course, you will:

1. Describe what precision agriculture is and why it is needed,
2. Explain the principles and applications of the Global Navigation Satellite System (GNSS),
3. Become familiar with Geographic Information Systems (GIS) and be able to utilize them,
4. Understand how soil sampling is used for precision agriculture,
5. Describe what a yield monitoring/mapping system is,
6. Identify current remote sensing technologies,
7. Explore principles and applications of variable rate technologies (VRT),
8. Be able to identify sensing technology for precision agriculture and
9. Become familiar with the history of artificial intelligence and its applications in agriculture.

Learning Materials and Supplies

The Precision-Farming Guide for Agriculturists, by Morgan and Ess, Deere & Company, **2017**. **4th Edition (ISBN: 0-86691-435-8**)

The textbook can be purchased in the UF Bookstore. Or John Deere Publications: 1-800-522-7448, Order no. FP404NC, Online: https://techpubs.deere.com/en-US/Search/Education for $46.59.

Materials and Supply Fee: $8.32

Lecture Topics:

Introduction to precision agriculture	Soil sampling
Geodesy	Yield mapping
Global navigation satellite system	Remote sensing
Differential GPS	Variable rate technologies
Geographic information system	Artificial Intelligence – history and applications

Laboratory Topics:

Introduction to precision agriculture	GIS 1 - Introduction
GPS	GIS 2 - GPS data comparison
DGPS & RTK	GIS 3 - Interpolation
Lightbar guidance & geocaching	Yield mapping
Variable rate application	

Course grading will be based on the following items:

1. Watching the lecture recordings and completing the laboratory exercises are required.

2. Tests: There will be three (3) tests. There will <u>not</u> be a comprehensive final examination. Tests will help review course materials and achieve course objectives. The test problems will be similar to those in the homework and quizzes.

3. Homework will be available on Canvas after each chapter. These will be extremely useful for preparing quizzes and tests.

4. Quizzes will be given after each module. The quiz problems are from all the course contents taught in the <u>previous</u> module, including lectures, lab exercises, and/or homework. Quizzes will help you study course materials and achieve course objectives.

5. DIY Quiz: After each module, you create three quiz problems of your own and upload them with answers in the E-Learning. They will help you prepare weekly Quizzes. The question format should be similar to the homework problems. See an example at the end of this syllabus.

6. There are 9 laboratory assignments. These hands-on assignments reinforce concepts taught within the lectures and offer you opportunities to work on various precision technologies.

7. All assignments should be submitted on time in Canvas. Email submissions will <u>NOT</u> be accepted.

Late submission policy: <u>All assignments are due by the deadline posted in Canvas.</u> Thereafter, there is a 10% reduction per day.

Instructor Interaction Plan
- Expect an instructor response to email and Canvas messages within 24 hours during weekdays.
- Please do not wait until the weekend to complete assignments, as I may be unable to answer emails or messages quickly. You are encouraged to complete assignments by Friday in case you encounter any unexpected problems.
- Expect instructor feedback for submitted assignments within one week after the assignment deadline.
- Grades for assessments will be released within one week of the deadline.
- If you ever have questions or need clarification on instructor feedback, please message or attend office hours.

- I will post an announcement at least once a week to give updates and class feedback.
- I will monitor and read the discussions. I may post to the entire class, within groups, or message you individually regarding the discussion to provide you with feedback.
- I invite your feedback in both midterm and end-of-term GatorEvals and plan to continuously improve student experience within the course. Your opinion is highly valued.

Required Technology & How to Obtain the Technology

- Textbook: see the Learning Materials and Supplies section.
- Hardware/software: A computer/laptop and Internet access. Microsoft Office.
- Required peripherals: speakers, a camera, and a microphone.
- Accounts: Gatorlink account
- All learning tools used, such as Perusall, PlayPosit, and Honorlock, are integrated into the Canvas course, and no purchase or downloading is necessary. Instructions on how to use each of these are in the Canvas course orientation module.
- A UF-owned Garmin GPS receiver will be provided to you through an equipment loan; see Canvas course for more information.
- All software that is required is free and available through GatorApps; see Canvas course for more information; some downloading is required.

Required Technology & Digital Information Literacy Skills

Technical skills:

- Using the learning management system
- Using email with attachments
- Creating and submitting files in commonly used word processing program formats
- Downloading and installing software
- Using spreadsheet programs
- Using presentation and graphics programs
- Using apps on digital devices
- Using web conferencing tools and software

Digital information literacy skills:

- Using online libraries and databases to locate and gather appropriate information
- Using computer networks to locate and store files or data
- Using online search tools for specific academic purposes, including the ability to use search criteria, keywords, and filters
- Analyzing digital information for credibility, currency, and bias (e.g., disinformation, misinformation)
- Properly citing information sources
- Preparing a presentation of research findings

Communication Guidelines

- Use **Course Question Discussion Board** for general course questions that others may have too.
- Use **Canvas Inbox (messaging tool)** for questions that are specific to your grades or submissions.
- **Email & phone correspondence** are for (1) setting a meeting time for office hours, (2) DRC accommodations; (3) emergency situations; or (4) highly sensitive situations.
- A respectful tone is used by all community members in all forms of communication.
- Written communication, both formal and informal, uses the official language of instruction rather than popular online abbreviations and graphic elements such as those sometimes used in social media.
- Video interactions reflect a respectful tone in verbal communications and body language.
- Spelling, punctuation, and grammar are correct.

Technical Support

UF Computing Help Desk & Ticket Number: All technical issues require a UF Helpdesk Ticket Number. The UF Helpdesk is available 24 hours a day, 7 days a week. https://helpdesk.ufl.edu/ | 352-392-4357

Weekly Course Schedule

All due dates are Sunday at 11:59 pm. Please keep in mind that faculty are unavailable to assist with questions after business hours and on the weekend. Be sure to review all assignments and labs in advance of the weekend.

Week & Dates	Lecture	Lab	DIY Quiz	Quiz	HW	Test
Week 1 (1/12-1/18)	Module 1 – Introduction to precision agriculture					
Week 2 (1/19-1/25)	Module 2 – Geodesy	Lab 1 – Introduction to precision agriculture				
Week 3 (1/26-2/1)	Module 3.1 – GPS	Lab 1 – Student presentation	#1	#1	#1	
Week 4 (2/2-2/8)	Module 3.2 Module 4.1 – DGPS		#2	#2	#2	
Week 5 (2/9-2/15)	Module 4.2 Module 5.1 – GIS	Lab 2- GPS	#3		#3	**Test 1**
Week 6 (2/16-2/22)	Module 5.2	Lab 3 – DGPS and RTK	#4	#3	#4	
Week 7 (2/23-3/1)	Module 6 – Soil sampling	Lab 4 – Lightbar guidance and Geocaching	#5	#4	#5	
Week 8 (3/2-3/8)	Module 7.1 – Yield mapping		#6	#5		

Week 9 (3/9-3/15)	Module 7.2 – Yield mapping	Lab 5 – GIS 1: Introduction	#7		#6	**Test 2**
Week 10 (3/16-3/22)	Spring break					
Week 11 (3/23-3/29)	Module 8.1 - Remote sensing	Lab 6 – GIS 2: GPS data comparison Return GPS Device	#8	#6		
Week 12 (3/30-4/5)	Module 8.2 - Remote sensing	Lab 7 – GIS 3: Interpolation	#9	#7	#7	
Week 13 (4/6-4/12)	Module 9 - Variable rate technology (VRT)	Lab 8 – Yield mapping	#10	#8	#8	
Week 14 (4/13-4/19)	Module 10 – AI History & Application	Lab 9 – VRT	#11	#9		
Week 15 (4/20-4/26)	Final review					**Test 3**

Grading Policy

Assignment Type	Percent of Final Grade
Tests (3)	45% (15% each)
Quizzes	15%
DIY Quiz	10%
Homework (discussions, homework assignments, lecture video review questions)	15%
Lab Assignments	15%

Grading Scale

91-100%	A
89-91%	A -
86-89%	B +
82-86%	B
79-82%	B -
76-79%	C +
72-76%	C
69-72%	C -
66-69%	D +
62-66%	D
59-62%	D -
Below 59%	E

AI Student Learning Outcomes (SLOs)

SLO2. Recognize, identify, describe, define, and/or explain applications of AI in multiple domains.
- Addressed by Lecture 10 and TA guest lecture
- Assessed by PlayPosit questions in the lectures, and questions in a quiz and test.

Instructional Materials

Instructional materials for this course consist of only those materials specifically reviewed, selected, and assigned by the instructor(s). The instructor(s) is only responsible for these instructional materials.

Academic Policies & Resources

Please refer to this page: https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/

Student Privacy Disclaimer:

Our class sessions may be audio-visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Software Use

All faculty, staff, and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Additional Information

Instructors may choose to clarify in their syllabus their teaching philosophy, expectations for classroom behavior, utilization of e-learning, and other information that will help students succeed in the course.

Tips to be successful in this course:

- Do not miss any lectures or labs
- Submit all assignments on time
- Fill out blanks in the lecture notes during lectures
- Learn how to solve Homework problems
- Practice questions in Respondus StudyMate Games
- Review textbook, lecture notes, and lab handouts regularly

Privacy and Accessibility Policies

Students are advised to protect their log-in and private information and that all these technologies have been vetted and are approved as compliant to UF privacy standards.

For information about the privacy policies of the tools used in this course, see the links below:

- Honorlock
  - [Honorlock Privacy Policy](#)
  - [Honorlock Accessibility](#)
  - For all quizzes and tests, room scans are required before beginning exams.
- Instructure (Canvas)
  - [Instructure Privacy Policy](#)
  - [Instructure Accessibility](#)
- Microsoft
  - [Microsoft Privacy Policy](#)
  - [Microsoft Accessibility](#)
- Perusall
  - [Perusal Accessibility](#)
  - [Perusal Privacy](#)
- PlayPosit
  - [PlayPosit Privacy Policy](#)
  - [PlayPosit Accessibility](#)
- Respondus
  - [Respondus Privacy Policy](#)
  - [Respondus Accessibility](#)
- Sonic Foundry (Mediasite Streaming Video Player)
  - [Sonic Foundry Privacy Policy](#)
  - [Mediasite Accessibility](#) (PDF)
- VoiceThread
  - [VoiceThread Privacy Policy](#)
  - [VoiceThread Accessibility](#)
- YouTube (Google)
  - [YouTube (Google) Privacy Policy](#)
  - [YouTube (Google) Accessibility](#)
- Zoom
  - [Zoom Privacy Policy](#)
  - [Zoom Accessibility](#)

Format of DIY quiz: The format of DIY quiz is below.

Questions:
1. Question 1…
2. Question 2…
3. Question 3…
Answers:
1. Answer 1…
2. Answer 2…
3. Answer 3…

<u>Example</u>

Questions:
1. What are the three objectives for precision agriculture?
2. What does SSCM stand for?
3. True/False: GPS stands for geographic positioning system.
Answers:
1. Reduce waste, increase profits, and maintain the quality of the environment
2. Site-specific crop management
3. False