

**Agricultural and Biological Engineering Department  
University of Florida**

**Agricultural Operations Management 4434**

**Precision Agriculture**

**Spring, 2022**

**Class number 10586 (Section PREC)**

**Class number 10587 (Section PRC2)**

**Catalog Description:**

**AOM 4434 Precision Agriculture.** *Credits: 3. Prereq: Junior standing.* 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.

**Instructor:** Congliang Zhou  
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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.

**Lecture Hours:** Mon 12:50 PM – 2:45 PM (Period 6-7), **Recorded Zoom videos will be used** for lectures. If needed, we meet in Rogers Hall 129, and the instructor will notify you in advance by email.

**Laboratory Hour:** Rogers Hall 211 & various other locations. **Lab exercises will be in-person hands-on exercises** and you will need to come to the classroom/various other places.

**Class 10586:** Tue 1:55 PM – 3:50 PM (Period 7-8), Rogers Hall 211

**Class 10587:** Thu 1:55 PM – 3:50 PM (Period 7-8), Rogers Hall 211

**Course homepage:** <https://elearning.ufl.edu/>.

**Office Hours:** Feel free to make an appointment for office hours. Online conference is available.

**Text:** *The Precision-Farming Guide for Agriculturists*, by Morgan and Ess, Deere & Company, **2017. 4th Edition (ISBN: 0-86691-435-8**, John Deere Publications: 1-800-522-7448, Order no. FP404NC, On-line: [https://www.deere.com/en\\_US/services\\_and\\_support/manuals/john-deere-publishing.page](https://www.deere.com/en_US/services_and_support/manuals/john-deere-publishing.page)).

Course lecture notes will be available on the E-Learning course website.

**Course Objectives:** This course covers information and *state-of-the-art* technologies used for precision farming and their applications. In this course we would like to:

1. Describe what precision agriculture is and why it is needed,
2. Explain basic principles and applications of the Global Navigation Satellite System (GNSS),
3. Become familiar with Geographic Information System (GIS) and be able to utilize it,
4. Understand how soil sampling is used for precision agriculture,
5. Describe what yield monitoring/mapping system is,
6. Identify current remote sensing technologies, and
7. Explore principles and applications of variable rate technologies.

**Lecture Topics:**

Introduction to precision agriculture  
 Geodesy  
 Global navigation satellite system  
 Differential GPS

Geographic information system  
 Soil sampling  
 Yield mapping  
 Remote sensing  
 Variable rate technologies

**Laboratory Topics:**

Introduction to precision agriculture  
 GPS  
 DGPS & RTK  
 Lightbar guidance & candy hunting

GIS 1 - Introduction  
 GIS 2 - GPS data comparison  
 GIS 3 - Interpolation  
 Yield mapping  
 Variable rate application

**Course Schedule (Dates are approximate)**

Week (Date)	Lecture (Mon)	Lab (Tue & Thu)	DIY Quiz	Quiz	HW	Test
1 (1/6)	N/A	(No class)				
2 (1/10)	Introduction/Syllabus review	Module 1 – Introduction to precision agriculture / Lab 1				
3 (1/17)	MLK Holiday	Module 2 – Geodesy				
4 (1/24)	Module 2 – Geodesy Module 3 – GPS	Lab 1 – Introduction to precision agriculture	#1	#1	#1	
5 (1/31)	(Continue Module 3)	Module 4 – DGPS	#2	#2	#2	
6 (2/7)	<b>Test 1</b> using Honorlock (2/7, No lecture)	Lab 2 – GPS	#3			Test 1
7 (2/14)	(Continue Module 4)	Lab 3 – DGPS and RTK	#4		#3	
8 (2/21)	Module 5 – GIS	Lab 4 – Lightbar guidance and candy hunting	#5	#3		
9 (2/28)	(Continue Module 5) Module 6 – Soil sampling	Lab 5 – GIS 1: Introduction	#6	#4	#4	
10 (3/7)	<b>Spring Break</b>					
11 (3/14)	Module 7 – Yield mapping	Lab 6 – GIS 2: GPS data comparison	#7	#5	#5	
12 (3/21)	<b>Test 2</b> using Honorlock (3/21, No lecture)	Lab 7 – GIS 3: Interpolation	#8		#6	Test 2
13 (3/28)	(Continue Module 7)	Module 8 – Remote sensing	#9	#6		
14 (4/4)	(Continue Module 8)	Lab 8 – Yield mapping	#10	#7		
15 (4/11)	Module 9 – Variable Rate Technology (VRT)	Module 9 – VRT / Lab 9 – VRT	#11	#8	#7	
16 (4/18)	<b>Test 3</b> using Honorlock (4/18, No lecture)	No Lab (This course ends on 4/18)	#12		#8	Test 3

**Course grading will be based on the following items:**

1. **Attendance** at lectures and laboratory exercises is required.
2. **Homework** will be assigned after each chapter is finished and will be due at the beginning of the class.

3. **Laboratory assignments** will be handed out for every laboratory session. The lab assignments are due at the beginning of the next lab period.
4. **Quizzes** will be given every Monday at the end of the lecture using Honorlock in the E-Learning. The quiz problems are from the previous week's lecture, lab exercise, homework, and DIY Quiz. The first quiz will be on **January 24**. Quizzes cannot be made up.
5. **DIY Quiz:** After Monday's lecture each week, you are required to upload three quiz problems with answers from the same week's lecture in the E-Learning. They will be due by **12:00 PM Monday** in the following week. The question format should be similar to the homework problems. See an example at the end of this syllabus. The first DIY Quiz will be due on **January 24**.
6. Every week the best quiz problem will be selected and given a 20% extra credit for the DIY Quiz. A 10% extra credit will be given to the first upload. You can upload your DIY Quiz starting at **3:00 PM Monday**. Those uploaded before 3 pm will not be counted. No late submission is accepted for DIY Quiz.
7. **All assignments should to be submitted in the E-Learning. No email/paper submissions will be accepted.**
8. **Late submission policy:** All assignments are due at the beginning of the class. After that, a 10% reduction/business day. See the detailed guidelines at the end of the syllabus.

**Tests:**      Test 1: Mon, **February 7**      Test 2: Mon, **March 21**      Test 3: Mon, **April 18**

**Grading** will be based on the following items and weights:

Tests (3):	15% each	91 – 100%	A	72 – 76%	C
Quiz:	20%	89 – 91%	A-	69 – 72%	C-
DIY Quiz:	10%	86 – 89%	B+	66 – 69%	D+
Homework:	10%	82 – 86%	B	62 – 66%	D
Lab assignment:	15%	79 – 82%	B-	59 – 62%	D-
		76 – 79%	C+	Below 59%	E

**Grades and Grade Points:** For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

**Attendance and Make-Up Work:** Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

**Online Course Privacy Related Issues:** 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.

**Online Course Evaluation Process:** Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

**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.

**Academic Honesty:** UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. [Click here to read the Honor Code](#). Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

**Services for Students with Disabilities:** 0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc](http://www.dso.ufl.edu/drc). The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

**Campus Resources:** Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university’s counseling resources.

#### Health and Wellness

- *U Matter, We Care:* If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.
- *Counseling and Wellness Center:* [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.
- *Student Health Care Center:* Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).
- *University Police Department:* [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).
- *Sexual Assault Recovery Services (SARS):* Student Health Care Center, 392-1161.
- *UF Health Shands Emergency Room / Trauma Center:* For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website](#)

#### Academic Resources

- *E-learning technical support:* Contact the [UF Computing Help Desk](#) at 352-392-4357 or via email at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu).
- *Career Connections Center:* Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- *Library Support:* Various ways to receive assistance with respect to using the libraries or finding resources.
- *Teaching Center:* Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.
- *Writing Studio:* 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.
- *Career Resource Center,* First Floor JWRU, 392-1601, <https://career.ufl.edu/>.
- Student Complaints Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>.
- Online Student Complaints: <http://www.distance.ufl.edu/student-complaint-process>

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

DIY Quiz-Due date

Questions:

1. Question 1...
2. Question 2...
3. Question 3...

Answers:

1. Answer 1...
2. Answer 2...
3. Answer 3...

**Example**

DIY Quiz-Jan 14

Questions:

1. What are the three objectives for precision agriculture?
2. What does SSCM stand for?
3. What geodetic datum do GPS receivers use primarily?

Answers:

1. Reduce waste, increase profits, and maintain the quality of the environment
2. Site-specific crop management
3. WGS84 and NAD83

**Assignment submission guidelines** – The following rules will be strictly enforced!

- Submit on time, i.e., “at the beginning of the class”!
- For Monday’s lectures, as it starts at 12:50 pm, one-day late submission starts from 12:51 pm until 12:50 pm the next day (24-hour period).
- Example 1: If your assignment is due Monday and you submit it at 1 pm on Monday, your submission is considered 1-day late (10% deduction). (I am sorry about this strict rule, however I have to enforce the rule fairly for all of you.)
- Example 2: If your assignment is due Monday and you submit it at 3 pm on Tuesday, your submission is considered to be 2-days late (20% deduction).
- All assignments should be submitted to the E-Learning. No email/paper submissions are allowed.
- If you show any extra effort on your assignments and activities during lectures and lab exercises, there is a **high potential for extra credit** and a high impact on your final grade. Examples include active participation in class discussion and volunteering during the lab exercises.
- There is **+alpha** for determining your final grade based on your participation and activities during the semester.