PURDUE UNIVERSITY | College of Engineering

Engineering Faculty Document
EFD# 93-26
November 19, 2025

TO: The Engineering Faculty

FROM: The Faculty of the Agricultural and Biological Engineering

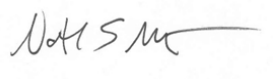
RE: New Course: ABE 42200

The Faculty Agricultural and Biological Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

COURSE INFORMATION:

Course Number:	ABE 42200
Course Title	Advanced Machine Technology for Agricultural Crop
Course Description:	The course examines technologies and techniques associated with modern farming practices often referred to in general as precision agriculture. It is structured to center around expert presentations from industry, academia, and farming practice, with a focus on technologies and appropriate application of such technologies in crop production systems in the Eastern Cornbelt.
Semester(s) Offered:	Spring
Credits:	3.00
Requisites:	Undergraduate level **ABE 31400** Minimum Grade of D- [may be taken concurrently] **and** Undergraduate level **ABE 33000** Minimum Grade of D- [may be taken concurrently]
Restrictions:	Must be Agricultural Engineering

Rationale:
ABE 422 provides students with advanced understanding and hands-on experience in precision agriculture systems, bridging the gap between agricultural machinery operation and emerging digital technologies. The course features an integrated lecture and laboratory experience emphasizing *spatial data analysis* and *data-driven decision making.* Students learn how modern agricultural equipment collects, transmits, and utilizes geospatial and sensor data to optimize crop production. Laboratory activities focus on real-world applications using equipment and data from Purdue's Agronomy Center for Research and Education (ACRE). Through these labs, students collect field data, clean and process datasets using open-source tools (e.g., QGIS, Python) and develop actionable management prescriptions such as variable-rate fertilizer or seeding maps.



Head/Director of the Agricultural and Biological Engineering Department

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ABE 422000
Advanced Machine Technology for Agricultural Crop Production

Course Information

Spring, 2025
Lecture: T, 9:30-11:20pm, ABE 3110
Lab: Thursdays, 9:30-11:20pm ABE 2098
Course Credit Hours: 3

Instructor

John Evans
ABE 2041J
jevansiv@purdue.edu
Office Hours: Upon request

Course Description

The course overviews principles and applications of modern farming practices often referred to in general as precision agriculture. It focuses on hands-on experience using hardware/software for mastering the essential skills to adopt site-specific crop management.

Prerequisites

ABE 31400 – Design of Electronic Systems and ABE 33000 – Design of Machine Components, or consent of instructor.

Class Resources

Practical Mathematics for Precision Farming *(free access available online through Purdue Libraries)*
D. E. Clay, S. A. Clay, S. A. Bruggeman, editors, 2017. Practical Mathematics for Precision Farming. ASA, CSSA, and SSSA, Madison, WI. doi:10.2134/practicalmath.frontmatter

Learning Outcomes

By the end of the course, you will be able to:

1. Identify and analyze key technologies used in precision agriculture.
2. Explain the significance of geo-referenced data in agricultural applications.
3. Utilize geographic information system (GIS) software for managing and analyzing spatial data.
4. Interpret and evaluate data generated by yield monitoring systems.
5. Identify and categorize major sources of errors in precision agriculture systems.
6. Analyze yield and soil nutrient maps to design site-specific crop management strategies.
7. Assess the advantages and limitations of current precision agriculture practices.

Instructor's Virtual Office Hours: Upon request

Instructor's Email Availability and Policies

I will be available via email daily and try to respond as soon as possible (generally within 24-48) hours. When emailing me, please place the course number/section and the topic in the subject line of the email (*e.g.,* XXX 240 – Assignment 2 Question). This will help me tremendously in locating and responding to your emails quickly.

Assignments

Participation	10%
Assignments	60%
Exams	30%
Total	100%

Grading Scale

- A: 93-100%
- A-: 90-92.99
- B+: 87-89.99
- B: 83-86.99
- B-: 80-82.99
- C+: 77-79.99
- C: 73-76.99
- C-: 70-72.99
- D+: 67-69.99
- D: 63-66.99
- D-: 60-62.99
- F: 59.99 or below

Missed or Late Work

To receive full credit assignments must be submitted by the due date. Assignments submitted after the due date will be docked 20% each day. Make-up exams and quizzes will not be permitted unless pre-authorized by the instructor or in the event of an emergency. In case of an emergency, appropriate documentation must be provided to turn in late work for full credit or make-up exams and quizzes.

Attendance

Students are expected to be present for every meeting of the classes in which they are enrolled. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts or absences can be anticipated, such as for many University sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email or phone. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, the student or the student's representative should contact the Office of the Dean of Students via email or phone at 765-494-1747.

Course Schedule

Class Schedule Spring 2025

Week	Date	Lecture/**Lab** Topic (tentative)
Week 1	1/14/2025	Introduction and Class Overview
	1/16/2025	**No Lab**
Week 2	1/21/2025	GIS and Coordinate Systems
	1/23/2025	**Lab #1 GIS Introduction Cont.**
Week 3	1/28/2025	Global Navigation Satellite Systems
	1/30/2025	**Lab #2 GPS Data**
Week 4	2/4/2025	Guidance & Automated Section Control
	2/6/2025	**Lab #3 Guidance (Field Trip)**
Week 5	2/11/2025	Technologies enabling VRA
	2/13/2025	**Lab #4 Accessing Public Data**
Week 6	2/18/2025	Yield Monitoring Systems
	2/20/2025	**Lab #5 Yield Data Processing**
Week 7	2/25/2025	Yield Data Quality
	2/27/2025	**Lab #6 Yield Editor Software**
Week 8	3/4/2025	Midterm Exam
	3/6/2025	**Mid-term Lab Practical**
Week 9	3/11/2025	Soil Sampling
	3/13/2025	**Lab #7 Soils Data Processing**
Week 10	3/18/2025	No Class (Spring Break)
	3/20/2025	**No Lab (Spring Break)**
Week 11	3/25/2025	Interpolation Methods and Strategies
	3/27/2025	**Lab #8 Rx Map Development**
Week 12	4/1/2025	On-Farm research using PA
	4/3/2025	**Lab #9 Trails Analysis**
Week 13	4/8/2025	Economics of Precision Ag
	4/10/2025	**Lab #10 Profitability**
Week 14	4/15/2025	Guest Speaker
	4/17/2025	**Project Work Time**
Week 15	4/22/2025	Guest Speaker
	4/24/2025	**Project Presentations**
Week 16	4/29/2025	Guest Speaker
	5/1/2025	**No Lab**
Week 17	TBD	Final Exam

* Schedule and assignments subject to change. Any changes will be posted in the learning management system.

Policies

Netiquette

Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic

discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Our differences, some of which are outlined in the University's nondiscrimination statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambience. Please read the Netiquette rules for this course:

- Do not dominate any discussion. Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Keep an "open-mind" and be willing to express even your minority opinion.
- Think and edit before you push the "Send" button.
- Do not hesitate to ask for feedback.

Incompletes

A grade of Incomplete (I) will be given only in unusual circumstances. To receive an "I" grade, a written request must be submitted prior to dead week and approved by the instructor. The request must describe the circumstances, along with a proposed timeline for completing the course work. Submitting a request does not ensure that an incomplete grade will be granted. If granted, you will be required to fill out and sign an "Incomplete Contract" form that will be turned in with the course grades. Any requests made after the course is completed will not be considered for an incomplete grade.

Students with Disabilities

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: **drc@purdue.edu** or by phone: 765-494-1247.

Academic Dishonesty

Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, University Regulations] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]

Purdue's student guide for academic integrity.
The Purdue Honor Pledge (see this link for additional information):
"As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue"

Copyrighted Materials

Students are expected, within the context of the Regulations Governing Student Conduct and other applicable University policies, to act responsibly and ethically by applying the appropriate exception under the Copyright Act to the use of copyrighted works in their activities and studies. The University does not assume legal responsibility for violations of copyright law by students who are not employees of the University.

A Copyrightable Work created by any person subject to this policy primarily to express and preserve scholarship as evidence of academic advancement or academic accomplishment. Such works may include, but are not limited to, scholarly publications, journal articles, research bulletins, monographs, books, plays, poems, musical compositions and other works of artistic imagination, and works of students created in the course of their education, such as exams, projects, theses or dissertations, papers and articles.

University Regulations on policies.

Violent Behavior Policy

Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.

See the University's website for additional information.

Emergency Statement

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. *You are expected to read your @purdue.edu email on a frequent basis.*

Accessibility and Accommodations

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center via email or by phone: 765-494-1247.

Diversity and Inclusion Statement

In our discussions, structured and unstructured, we will explore a variety of challenging issues, which can help us enhance our understanding of different experiences and perspectives. This can be challenging, but in overcoming these challenges we find the greatest rewards. While we will design guidelines as a group, everyone should remember the following points:

- We are all in the process of learning about others and their experiences. Please speak with me, anonymously if needed, if something has made you uncomfortable.
- Intention and Impact are not always aligned, and we should respect the impact something may have on someone even if it was not the speaker's intention.
- We all come to the class with a variety of experiences and a range of expertise, we should respect these in others while critically examining them in ourselves.

Nondiscrimination Statement

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies.

Mental Health Statement

If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try Therapy Assistance Online (TAO), a new web and app-based mental health resource available courtesy of Purdue Counseling and Psychological Services (CAPS)**.** TAO is available to students, faculty, and staff at any time.

If you need support and information about options and resources, please contact or see the Office of the Dean of Students (ODOS). Call 765-494-1747.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc., sign up for free one-on-one virtual sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the session. Sign up is free and can be done on BoilerConnect.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 during and after hours, on weekends and holidays.

Basic Needs Security:

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed, and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday.

Course Evaluation

During the last two weeks of the course, you will be provided with an opportunity to evaluate this course and your instructor. Purdue uses an online course evaluation system. You will receive an official email from evaluation administrators with a link to the online evaluation site. You will have up to two weeks to complete this evaluation. Your participation is an integral part of this course, and your feedback is vital to improving education at Purdue University. I strongly urge you to participate in the evaluation system.

Disclaimer

This syllabus is subject to change. Any changes will be posted on Brightspace and an announcement will be made.