

Course Outline

Instruction Team

- **Dr. Jiating Li**
E1-342 EITC
(204) 474-8429
Jiating.Li@umanitoba.ca
- **Dr. Uduak Edet**
A204 Agricultural Engineering
Building
(204) 474-6859
Uduak.Edet@umanitoba.ca

Student Hours

- We will be present during lectures/labs.
- Individual assistance is available by appointment.

Teaching Assistant

- **Mehran Azizpour**
azizpoum@myumanitoba.ca

Class Location

- **Lecture: E2-320 EITC**
MWF 9:30 – 10:20 AM
- **Lab: E2-110 EITC**
Mon: 2:30 - 4:20 PM

Contact Hours

- 4 credit hours
- Lectures:
3 hours x 12 weeks = 36 hours
- Labs:
1 hour x 12 weeks = 12 hours

Prerequisites:

- None.

Course Website:

<http://umanitoba.ca/umlearn>

Traditional Territories Acknowledgement

The University of Manitoba campuses are located on the original lands of the Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the Métis Nation.

We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.

BIOE 0222 Precision Agriculture – Technological Tools for Making Decisions

Winter 2026

Course Description

Precision agriculture is a philosophy of agricultural management that has been enabled by modern technology. This course will examine both the technology and the techniques that can be used to improve the efficiency of agricultural operations by decreasing costs, increasing profits, and decreasing hazards to the environment. Students will be introduced to current and emerging technologies for crop, livestock, and business management. Students will have the opportunity to apply data generated from these technologies to support the decision-making required by farm managers.

Course Objectives

The intent of this course is to:

1. Explain the philosophy of precision agriculture.
2. Provide students with a comprehensive understanding of the theory and application of precision agriculture technologies.
3. Expose the student to a broad spectrum of precision agriculture technology.
4. Understand the economics associated with precision agriculture practices.

General Course Topics

Lecture topics will include an introduction to precision agriculture, GPS guidance technologies, farm data capturing and transfer, information handling and management (GIS), variable rate technologies, precision livestock, and the economics of using precision agriculture technologies.

Intended Learning Outcomes

At the conclusion of the course, the student should be able to:

- Identify precision agriculture concepts that can be used to address these farm-related decisions or actions.
- Identify the components of the global positioning system.
- Describe how the global positioning system can be used by an individual farmer.
- Discuss the implications of the accuracy that can be achieved with the use of the global positioning system.
- Explain how guidance technologies work.
- Explain how variable rate seeding technology works.
- Explain how variable rate spraying technology works.
- Explain how grain yield monitors work.
- Explain processes used for soil sampling.
- Explain processes used for crop mapping during the growing season.
- Explain the concept of a geographic information system.
- Interpret a yield map.
- Explain the environmental benefits associated with the use of precision agriculture practices.
- Identify typical farm-related decisions or actions that influence the overall efficiency of the farm.

Important Dates

- **Experiential Learning**
Jan 22, 26 to 27, 2027 (tentative)
No classes or examinations
- **Last Day to Drop without Penalty**
January 16, 2026
- **Louis Riel Day**
Feb 16, 2024
No classes or examinations
- **Winter Term Break**
Feb 16–20, 2026
No classes or examinations
- **Midterm Examination**
TBD
- **Voluntary Withdrawal Deadline**
March 13, 2026
- **Last Day of Classes**
April 2, 2026
- **Good Friday**
April 3, 2026

Grading Scale

Letter Grade	Percentage out of 100
A+	92-100
A	85-91
B+	78-84
B	72-77
C+	66-71
C	60-65
D	50-59
F	Less than 50

Assignment Feedback

Students can expect to receive graded assignments within two weeks after the set deadline, but this may be longer for late submissions.

Late Submission Policy

Assignments submitted after the due date will be docked 10% per day late.

Missed Assignments

Will receive a zero grade.

Textbook

Required textbook – None

Supplementary readings:

- The Precision Farming Guide for Agriculturists, An Agricultural Primer, 3rd Edition, Deere & Company.
- Kaplan, E. D., & Hegarty, C. (2017). Understanding GPS/GNSS: Principles and Applications (Vol. Third edition). Boston: Artech House.
- David E. Clay and John F. Shanahan (2011). GIS applications in precision agriculture - Volume Two. CRC Press. ISBN: 978-1-4200-9270-7.
- Heege, Hermann J. 2013. Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and Results

*A set of course notes has also been prepared and will be posted on the UM Learn portal for this course. Students are responsible for the content covered in these course notes for the midterm and final examinations.

Contingency Teaching Plan

The Department of Biosystems Engineering has devised a plan so that there is minimal impact on the delivery and content of the course, should the instructor fall sick and is unable to continue lectures in person. Please be assured that the alternative plan outlining any deviation from the normal mode of instruction will be communicated to you as quickly as possible if/when the need arises.

Evaluation

The basis of evaluation is established by agreement at the beginning of each term. Weights assigned to various components of work are:

Description	Allocation
In-class Activities/Quizzes	10%
Midterm Examination	15%
Labs and Assignments	40%
Project	10%
Final Examination	25%

Group Work Policies

Students are allowed to discuss laboratory results with lab partners or others, but the final report must be independently written. Copying (or joint production of reports without the instructors' permission) will result in both reports receiving a zero mark.

Missed Exams

There is NO make-up examination for a missed mid-term! If missed and the student has a valid medical certificate or compassionate reason (e.g., death of an immediate family member), marks from mid-term will be added to marks for the final examination. Students who miss the examination without a valid reason will receive a grade of zero (0) for the midterm examination. In the case of a missed final examination, a student will be assigned an "F" and no paper grade for the course unless an acceptable medical certificate or a confirmable compassionate reason is provided, in which case a supplementary examination will be allowed.

Academic Integrity

In accordance with the *General Academic Regulations on Academic Integrity*, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). This includes the unauthorized use of AI when preparing course deliverables. A student found guilty of contributing to cheating by another student is also subject to a serious academic penalty. Integrity also applies to respecting copyrighted course content, which should not be distributed without the creator's permission. Uploading content for the purpose of transcription or other AI-enabled features is commonly a violation of the copyright holder's rights.

Requirements/Regulations

- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, smart watches, wireless communication, or data storage devices) are allowed in examinations unless the course instructor approves.
- Please copy the Instruction Team in all emails (Instructors and Teaching Assistants). All email communication must conform to the Communicating with Students university policy.

 [Communicating with Students](#)

- Attending lectures and laboratories is mandatory for the successful completion of this course.
- Self-declaration forms may be completed for missed tests, exams, or assignments during short-term absences (≤ 72 hours) for extenuating circumstances. Students don't need to share personal information about their situation beyond declaring the nature of the extenuating circumstance on the self-declaration form.

 [Self-Declaration Form for Brief or Temporary Absence](#)

- This form cannot be used for planned absences like vacations. It is also not to be used for longer-term absences, or ongoing circumstances (e.g., Authorized Withdrawals, Leaves of Absence, or other accommodations), which will still require additional documentation.

 [Self-Declaration Policy for Brief or Temporary Absences](#)

- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should familiarize themselves with the University's *General Academic Regulations*.


 [General Academic Regulations](#)

- Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g. Academic Integrity, Respectful Behaviour, Examinations and related matters.

 [Supplemental Resources](#)

Deferred Final Examinations

Students who miss the regularly scheduled writing of a final examination for valid medical or compassionate reasons will only be allowed to write a deferred exam if the Faculty of Agriculture Academic Advising Office approves the request. All requests for a deferred examination *must* be made within 48 hours of the missed exam and follow the procedure described on the Faculty [website](#) without exception. **Course Instructors do not have the discretion to grant deferred final examinations.**

 [Deferred Exam Policy \(student experience website\)](#)

Retention of Student Work

Students are advised that copies of their work submitted in completing course requirements (i.e. assignments, laboratory reports, project reports, test papers, examination papers, etc.) may be retained by the instructor and/or the department for the purpose of student assessment and grading. This material shall be handled in accordance with the University's *Intellectual Property Policy* and the protection of privacy provisions of *The Freedom of Information and Protection of Privacy Act (Manitoba)*. Students who do not wish to have their work retained must inform the Head of Department, in writing, at their earliest opportunity.

Copyright Notice

All materials provided in this course are copyrighted and are provided under the fair dealing provision of the Canadian Copyright Act. This material may not be redistributed in any manner without the express written permission of the relevant copyright holder.

 [Copyright Office](#)