



## Course Outline

### Instruction Team

Dr. Ying Chen, P.Eng.  
E1-349 EITC  
[Ying.Chen@umanitoba.ca](mailto:Ying.Chen@umanitoba.ca)

### Student Hours

Individual assistance is available by appointment and emails.

### Teaching Assistant

Ernest Owusu-Sekyere  
[owususee@myumanitoba.ca](mailto:owususee@myumanitoba.ca)

### Location

**E2-310 EITC**  
Tues 10:00 - 11:15 AM  
Thurs 10:00 - 11:15 AM

### Contact Hours

- 3 credit hours
- Lectures:  
3 hours x 12 weeks = 36 hours

### Prerequisites:

- Registered in the Biosystems Engineering program.

### Course Website:

<http://umanitoba.ca/umlearn>

## BIOE 7310 Material Incorporation into Soil

Winter 2024

### Course Description\*

Types and characteristics of agricultural materials; solid and liquid waste (including manure) incorporation; crop residue incorporations, seed placement; chemical incorporation; methods and equipment; performance evaluation; measurement technique.

\*This is an elective course for graduate students in Biosystems Engineering.

### Course Objectives

The agricultural materials to be dealt with include solid and liquid waste, crop residue, seeds and chemical fertilizers. The objectives of this course are to provide students with comprehensive knowledge of incorporation of these materials into soil, including soil properties, incorporation of agricultural wastes, crop residue, and chemicals into soil through tillage practices, and seed placement in soil. The course will also provide students the knowledge of measurement techniques and sustainable agricultural mechanisation for energy saving and environment protection.

### Lecture Content\*

#### Introduction

- Types of agricultural materials
- Significance of material incorporation in agriculture

#### 1. Soil properties and soil engaging tools

- Soil mechanical properties
- Working principle of soil engaging tools
- Soil cutting and forces
- Tractor power requirement

#### 2. Crop residue incorporation

- Soil conservation
- Tillage equipment for residue incorporation
- Measurements of residue on soil surface and in soil
- Effects of residue cover on tillage and seeding performance

#### 3. Seed placement

- Seed placement and soil-seed contact
- Seeding performance evaluation
- No-till seeding and equipment

## Grading Scale

Note: These boundaries represent a guide for the instructor and class alike. Provided that no individual student is disadvantaged, the instructor may vary any of these boundaries to ensure consistency of grading from year-to-year.

Letter	Mark
A+	90–100
A	85–89
B+	80–84
B	75–79
C+	65–74
C	60–64
F	< 50

## Important Dates

- **Early Withdrawal Deadline**  
Jan. 19, 2024
- **Winter Term Break**  
Feb. 19-23, 2024  
No classes or examinations
- **Voluntary Withdrawal Deadline**  
March 20, 2024
- **Last Day of Classes**  
April 10, 2024

### 4. Chemical incorporation

- Incorporation of dry chemicals
- Incorporation of liquid chemicals
- Incorporation methods and equipment
- Performance evaluation

### 5. Waste/organic fertilizer incorporation

- Nutrient management and application rate
- Design and evaluation of incorporation equipment
- Solid and liquid waste incorporation
- Environmental impacts

\*Lecture notes will be posted on the UM Learn portal.

### Textbook

Three Chapters in Srivastava, A.K., Goering, C.E., Rohrbach, R.P., Principles of Agricultural Machines. Students do not need to buy the textbook. The chapters to be used in the course will be posted in UM Learn.

### Evaluation

Component	Value (%)	Assessor	Feedback*
Final exam	50	Instructor	S and F
Midterm (March 7, Thursday, 10:00-11:15)	25	Instructor	S and F
Lab demonstration/test and reports; (reports will not be graded, if students miss the lab demonstrations without valid reasons; There will be about 5 lab demonstrations/tests which will take place during lecture times)	5	TA	S and F
Assignments	20	TA	S and F

\*Method of Feedback: **F** - Formative (written comments), **S** - summative (numerical grade)

### Late Submission Policy

- Assignments and lab reports submitted after the due date will be docked 10% per school day for the first three days, and submission after three days will receive a zero grade.
- Each student is allowed to have one late submission of assignments or lab reports (but no later than 3 days). You are responsible to inform the TA when you want to use this allowance.

## Academic Integrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, 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). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

## 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 approved by the course instructor.
- All email communication must conform to the Communicating with Students university policy.

 [Communicating with Students](#)

- Attending lectures and laboratories is essential for the successful completion of this course.
- Self-declaration forms may be completed for missed tests, exams, or assignments during short-term absences ( $\leq 72$  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](#)

## 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.

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