Course Outline

Instruction Team
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- Teaching Assistant
- No

- Lecture location: E2 164
  Lecture time: TR 11:30-12:45 pm
- Student Hours
  Individual assistance is always available by appointment – stop by!
- Contact Hours
  3 credit hours per week
  Lectures:
  3 hours x 12 weeks = 36 hours
- Course Website:
- http://umanitoba.ca/umlearn

# BIOE 7200 Bulk Solids Storage & Handling / BIOE 4390 Unit Operations I

**Prerequisites and how they apply to this course**
CIVL 2790 (or 023.279) or MECH 2260 (or 025.226), BIOE 3270 (or 034.327). Co-requisites BIOE 3320 (or 034.332 or 034.323), BIOE 3580 (or 034.358 or 034.326).

## General Course Information

Design is one of the core graduate attributes identified by the Canadian Engineering Accreditation Board (CEAB). Engineers must have sufficient skills to analyze complex problems and solve challenging, open-ended problems within real time constraints. This course specifically introduces equipment and systems used in farming, mixing, size reduction, separation and size enlargement of value-added food products. Furthermore, students will use the basic engineering discipline to analyze the effect of physical properties of the handling materials on the operation of unit operation systems. The course will facilitate the engineering students to develop the CEAB graduate attributes needed for a career as a professional engineer.

### Course Goals

The intent of this course is:
To introduce engineering students to design, application, and characteristics of operation systems, including property of particulate solids, pneumatic systems, particle size reduction, and mechanical conveyors such as belt, screw, vibratory, chain-type, and bucket conveyors.

### Intended Learning Outcomes

On satisfactory completion of this course, students will be able to:

1. understand the effect of physical properties on the selection of unit operation systems.
2. select the most suitable operation system for a given application.
3. evaluate the design variables and performance for operation systems; and
4. design operation systems for different applications.

### Instructional Methods

Learning is most effective when both the teacher and the students are engaged in subject materials. The role of the instructor, therefore, is to create an environment that facilitates student engagement (and therefore learning). In this course, most dissemination of information will occur using the traditional lecture format (PowerPoint slides and writing on

## 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 |

Accreditation Units
Mathematics: 0%
Natural Science: 0%
Complementary Studies: 0%
Engineering Science: 50%
Engineering Design: 50%

white board). A substantial portion of the content will be "presented" experientially through assignments and in-class examples. Therefore, you will be expected to prepare for class by reading the course text, completing the assignments, and questioning the professor whenever possible.

**Course Content:**

| Lecture order | Course content | Instructor |
|---|---|---|
| 1 | Material physical property characterization and analysis | Derek |
| 2 | Belt conveyor | Derek |
| 3 | Chain conveyor | Derek |
| 4 | Unit operation design for bulk solids handling (October 16 and 18) | Dr. Jian |
| 5 | Screw conveyor | Derek |
| 6 | Vibrator conveyor | Derek |
| 7 | Bucket conveyor | Derek |
| 8 | Size reduction | Dr. Jian |
| 9 | Pneumatic system I | Dr. Jian |
| 10 | Pneumatic systems II | Dr. Jian |

**Texts, Readings, Materials**

**Required textbook** – The following book is available from the University of Manitoba Bookstore and Library.
M. E. Fayed and T.S. Slocir. 1997. Mechanical Conveyors, Selection and Operation. Techonomic Publishing CO. Inc.

**Supplementary Reading**

A set of course notes has been prepared. The course notes will be distributed before each lecture. Students are responsible for the content covered in these course notes for the middle and final examinations.

**Description of Assignments**

There are 6 written assignments throughout the semester. Each assignment will consist of questions. The questions include the understanding of theories, principles, and design works. Each student will work on an individual basis.

They are to be answered in full using the methodology described in the class and assigned text. A question will be considered correct only if it is answered in the appropriate format, using appropriate significant digits and has an answer(s). The reports should be presented in a neat and easy to read format (handwriting is acceptable).

- **Early Withdrawal Deadline**
  September 16, 2025
- **National Day for Truth and Reconciliation**
  Mon. Sep. 30, 2025
  No classes or examinations
- **Thanksgiving**
  Mon. October 13, 2025
  No classes or examinations
- **Fall Term Break**
  Nov.10-14, 2025
  No classes or examinations
- **Voluntary Withdrawal Deadline**
  November 18, 2025
- **Last Day of Classes**
  December 8, 2025
- **Midterm exam**: Oct. 21 (Tuesday)
- **Final examination**: Arranged by the Department

**Description of lab work**
The students registered 4 credit hours (BIOE 4390) will conduct five labs and write reports. The students will also work with Part-time and PhD students to conduct two lab studies related to airflow velocity and resistance. Before the lab experiments are conducted, the students will review the provided and related materials. After the lab experiments are completed, the student will submit a comprehensive report.

**Description of examinations**
One midterm examination is scheduled on October 21. A final examination will be scheduled at the end of the semester. The examination will test the student's knowledge of the lecture material covered in this course.

The test and exam will be closed/open books. Test and exam questions will be similar to those assigned during the course plus descriptive questions on theory and course contents. Material presented in class in the textbook will be covered.

**Late Assignments**
Will not be accepted and will receive a zero grade.

**Missed Assignments**
Will receive a zero grade unless student has a valid medical certificate or compassionate reason (see Missed Exams).

**Missed Exams**
There will be no "make-up" midterms. If a midterm examination is missed and the student has a valid medical certificate or compassionate reason (i.e., death of an immediate family member), the grade will be transferred to the final. Students who miss a midterm examination without a valid reason will receive a grade of zero for the midterm examination.

**Grade Evaluation**

The grade for this course will be based on assignments, one midterm examination, and a final examination. The final grade is the combination of the following grades:

45% Final Examination (2 hrs)

35% Midterm Examination (75 min)

20% Assignments (including 10% of lab work for the BIOE 4390 students).

**Academic Integrity**
Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty. Cheating in

examinations or tests may take the form of copying from another student. Exam cheating can also include exam impersonation. A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty. Students should acquaint themselves with the University's policy on plagiarism, cheating, exam impersonation and duplicate submission.

**Use of Third-Party Detection and Submission Tools**

Electronic detection tools may be used to screen assignments in cases of suspected plagiarism.

**Group Work Policies:**

All assignments are to be done as individuals and the University's policy plagiarism does apply to assignments (see Academic Integrity above).

**Additional Policies:** The tutorials are not optional.

## 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 (≤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*, as well as Section 3 of the Faculty of Engineering *Academic Regulations* dealing with incomplete term work, deferred examinations, attendance, and withdrawal.

*General Academic Regulations*

*Engineering 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, and to support the ongoing accreditation of each Engineering program. 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 copyright 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*

## 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 Associate Dean (Undergraduate) 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)*