



Course Outline

Instruction Team

- Dr. Warren Blunt P.Eng. (he/him)
E1-310 EITC
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Student Hours

- Individual assistance is always available by appointment, please send Dr. Blunt an email to set up a meeting.

Teaching Assistant

- Jayden Loeppky
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Location

- **EITC E2-165**
Mon 12:30 - 1:20 pm
Wed 12:30 - 1:20 pm
Fri 12:30 - 1:20 pm

Contact Hours

- 3 credit hours
- Lectures: 37 hours

Prerequisites:

- Enrollment in Biosystems Engineering program or the Faculty of Science

Course Website:

<http://umanitoba.ca/umlearn>

BIOE 2480 Impact of Engineering on the Environment Winter 2026

Course Description

Students will gain an understanding of overall sustainability of industrial activities, life-cycle and risk assessment techniques for sustainability, and design improvements to enhance environmental performance of engineered systems. This course will introduce basic methodologies for conducting environmental impact assessments, including physical, chemical, ecological, social and economic impacts.

General Course Information

Understanding the various impacts of engineering on the environment and related core concepts surrounding sustainable practices is essential to all engineers. Concepts around life-cycle assessment and associated tools for engineering applications are also important to engineers. Most development projects, whether they are small and local or large and national, require environmental impact assessments to ensure that environmental, economic and social effects of such projects are reviewed and potentially significant adverse impacts are mitigated. These assessments are important in the quest for sustainable development and allow for public participation in the process. This course will help you attain this critical environmental engineering competency and provide you with a valuable skill you can use in the workforce.

How this course fits into the curriculum

This is a required course in the Biosystems Engineering program. It is intended that students take this course during their second or third year in the program. As mentioned above, this course introduces the student to several sustainability, environmental stewardship, and environmental impact assessment concepts, which are not reliant upon any particular pre-requisites within the curriculum.

Course Goals

The intent of this course is to:

- introduce students to sustainability concepts around energy/materials use and environmental emissions,
- familiarize students with life-cycle assessment tools for engineering applications,
- introduce students to Environmental Impact Assessment (EIA) laws and regulations existing in Manitoba, Canada, and worldwide,
- provide students with a clear methodology to conduct successful EIAs,
- enable students to evaluate the quality and completeness of existing EIAs, and
- have students appreciate the importance of sustainable development and a healthy environment.

Intended Learning Outcomes

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

1. Understand the environmental impact assessment process.
 - 1.1. Define relevant terms.
 - 1.2. Describe the provincial (Manitoba) and federal EIA processes using a flowchart.
 - 1.3. Differentiate between an environmental impact assessment, an environmental site assessment, and an environmental management system.
2. Assist in preparing an environmental impact assessment report.
 - 2.1. Identify the relevant characteristics of a proposed action.
 - 2.2. Describe the baseline environmental conditions.

Accreditation Details

Accreditation Units

- Mathematics: 0%
- Natural Science: 0%
- Complementary Studies: 50%
- Engineering Science: 50%
- Engineering Design: 0%

Graduate Attributes

KB: A knowledge base for engineering

PA: Problem analysis

IN: Investigation

DE: Design

ET: Use of engineering tools

IT: Individual and teamwork

CS: Communication skills

PR: Professionalism

IE: Impact of engineering on society/environment

EE: Ethics and equity

EP: Economics and project management

LL: Life-long learning

Competency Levels

I - Introduced

D - Intermediate (Developing)

A - Advanced

- 2.3. Identify likely impacts on the environment.
- 2.4. Predict the impact on the environment.
- 2.5. Predict the cumulative effect in a given scenario.
- 2.6. Design an appropriate mitigation measure for a predicted impact.
- 2.7. Devise a plan to obtain public input in an EIA study.
- 2.8. Write a clear explanation of a predicted impact.
3. Appreciate the importance of protecting the environment.
 - 3.1. Explain the importance of sustainable development and environmental stewardship.
 - 3.2. Understand concepts associated with life-cycle assessment.

Textbook, readings, and materials

There is no required textbook for this course; below are recommended reading materials and book references.

- Allen and Shonnard. 2011. *Sustainable Engineering: Concepts, Design, and Case Studies*, Prentice Hall. New York, NY: Routledge. ISBN: 978-0-13-275654-9
- Morris and Therivel. 2009. *Methods of Environmental Impact Assessment*, 3rd edition. New York, NY: Routledge. ISBN: 978-0-415-44174-2
- Hanna, K.S. 2016. *Environmental Impact Assessment*, 3rd Edition, Oxford University Press, Don Mills, Ontario. ISBN: 978-0-19-900662-5
- Noble, B.F. 2021. *Introduction to Environmental Impact Assessment*. A Guide to Principles and Practice. 4th edition. Oxford University Press. ISBN: 9780199028894
- Mulligan, M. 2018. *An Introduction to Sustainability: Environmental, Social, and Personal Perspectives*. Second Edition. New York, NY: Routledge. ISBN 9781138698307.

Learning Outcomes

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

No.	Learning Outcome	Transferable Skill
1	Understand the environmental impact assessment process.	Impact of engineering on society/environment
2	Assist in preparing an environmental impact assessment report.	Impact of engineering on society/environment
3	Appreciate the importance of protecting the environment.	Impact of engineering on society/environment

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 year-to-year grading consistency.

Letter	Mark
A+	95–100
A	86–94
B+	80–85
B	73–79
C+	65–72
C	60–64
D	50–59
F	< 50

CEAB Graduate Attributes Assessed

This course will assess the following CEAB graduate attribute indicators shown below:

Indicator (Level)	Indicator Description	Assessment Point
IE.1 (D)	Understands engineering as a sociotechnical process with inherent environmental, economic, health, safety, legal and socio-cultural aspects.	Term Tests 1-4 Assignment 1-4
IE.2 (D)	Analyzes engineering activities and/or develops solutions, taking into account past, present, and potential future environmental and socio-cultural aspects.	Term Test 1,3 Assignment 4
IE.3 (D)	Understands and/or applies the concepts of environmental stewardship, and sustainable design and sustainable development.	Term Test 1-4 Assignments 1, 2
EP.2 (D)	Understands and applies business practices including project, risk and change management.	Term Tests 2-4 Assignments 3, 4

Important Dates

- **Assignment #1 due**
January 23, 2026
- **Term Test-1**
January 30, 2026
- **Assignment #2 due**
February 13, 2026
- **Louis Riel Day**
February 16, 2026
No classes or examinations
- **Winter term break**
Feb. 17 - 20, 2026
- **Term Test-2**
February 27, 2026
- **Assignment #3 due**
March 6, 2026
- **Voluntary Withdrawal (VW)**
March 19, 2026
- **Term Test-3**
March 20, 2026
- **Assignment #4 due**
April 2, 2026
- **Term Test-4**
April 8, 2026
- **Last Day of Classes**
April 9, 2026
- **Good Friday**
April 3, 2026
No classes or examinations

Class Schedule

A preliminary schedule is provided below. The schedule is subject to change at the discretion of the instructors and/or based on the learning needs of the students but such changes are subject to Section 2.8 of the ROASS Procedure.

- Week 1: Industrial activity and the environment, energy usage, and resource depletion
- Week 2: Environmental Emissions as it relates to air & water pollution, solid & hazardous wastes
- Week 3: Life-cycle Assessment for Sustainability
- Week 4: The Nature and Origins of Environmental Impact Assessment
- Week 5: Federal and Manitoba EIA process
- Week 6: Describing the existing environment, baseline conditions
- Week 7: Methods for impact identification and prediction
- Week 8: Significance of impacts, mitigation and monitoring
- Week 9: Description of Social and Economic Impacts
- Week 10: Description of Noise and Traffic Impacts
- Week 11: Cultural & Heritage Impacts
- Week 12: Follow up and post project monitoring
- Week 13: Cumulative effects assessment and strategic environmental assessments

Evaluation

Component	Value (%)	Assessor	Method of Feedback*	Learning Outcomes Evaluated	I/T**
Assignments (4 @ 5% ea.)	20	TA	S/F	1, 2, 3	I
Term Test 1	20	WB	S	1, 2, 3	I
Term Test 2	20	WB	S	1, 2, 3	I
Term Test 3	20	WB	S	1, 2, 3	I
Term Test 4	20	WB	S	1, 2, 3	I

* Method of Feedback: **F** - Formative (written comments and/or oral discussion), **S** - summative (numerical grade)

** I/T: **I** – Individual effort, **T** – Team effort

Each Term Test will cover approx. 3 weeks of course materials and will take place in-person during lecture time. There will be no final exam.

Assignment Grading Times

Students can expect to receive grades for at least two of the assignments and two term tests prior to the voluntary withdrawal date. Grades for the remaining assignments and test will be available prior to the end of the term.

Assignment Extension and Late Submission Policy

Assignments submitted after the due date will be docked 10% per day. There will be no “makeup” term tests; students who miss a test with a reasonable and verifiable explanation will have the value of their remaining tests increased by the appropriate percentage.

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.

Traditional territories

The University of Manitoba campuses and research spaces are located on original lands of Anishinaabeg, Ininiwak, Anisninewuk, Dakota Oyate, Dene and Inuit, and on the National Homeland of the Red River Métis.

UM recognizes that the Treaties signed on these lands are a lifelong, enduring relationship, and we are dedicated to upholding their spirit and intent. We acknowledge the harms and mistakes of the past and the present. With this understanding, we commit to supporting Indigenous excellence through active Reconciliation, meaningful change, and the creation of an environment where everyone can thrive. Our collaboration with Indigenous communities is grounded in respect and reciprocity and this guides how we move forward as an institution.

Updated: December 23, 2025

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.

[!\[\]\(0aff635c4179ba9e710b00f4b01d3b20_img.jpg\) *Communicating with Students*](#)

- Regular attendance and participation is expected of all students in all courses. Excused absences for medical or compassionate reasons must follow the UM policies. When the number of unexcused absences and/or incomplete coursework in any course exceeds 10 percent, the instructor shall report the case to the Department Head. If a student's attendance or work continues to be unsatisfactory, the case will be referred to the Associate Dean Undergraduate Programs who may initiate debarment of the student. Students who are debarred for inadequate attendance and participation prior to the VW deadline can choose to VW the course. Students who are debarred after the VW deadline will receive a failing grade.
- 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.

[!\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\) *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.

[!\[\]\(6bb0e4f14c4133b37d2887cb37e67ddd_img.jpg\) *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.

[!\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\) *General Academic Regulations*](#)

[!\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3_img.jpg\) *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.

[!\[\]\(41aea2746216b27a6939d696d8e035da_img.jpg\) *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.

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