



Course Outline

Instruction Team

- Dr. Warren Blunt P.Eng. (he/him)
E1-310 EITC
(204) 474-7144
Warren.Blunt@umanitoba.ca

Student Hours

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

Teaching Assistant

- Kenton McCorquodale-Bauer,
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Location

- **E2-330 EITC Bldg**
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

Course Website:

<http://umanitoba.ca/umlearn>

BIOE 2480 Impact of Engineering on the Environment Winter 2024

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 prerequisites 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

- 1 - Knowledge (Able to recall information)
- 2 - Comprehension (Ability to rephrase information)
- 3 - Application (Ability to apply knowledge in a new situation)
- 4 - Analysis (Able to break problem into its components and establish relationships.)
- 5 - Synthesis (Able to combine separate elements into a whole)
- 6 - Evaluation (Able to judge the worth of something)

- 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. 2015. *Introduction to Environmental Impact Assessment*. A Guide to Principles and Practice. 3rd edition. Oxford University Press, Don Mills, Ontario. ISBN: 978-0-19-900634-2

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

Graduate Attribute Competency Levels Developed

Outcome	KB	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
1									D			
2									D			
3									D			

CEAB Graduate Attributes Assessed

- IE.2 – Ability to consider the impact of engineering interventions (decisions and technology) on society and the environment (historical and/or contemporary).
- IE.3 – Ability to identify solutions to challenges in society and the environment.
- IE.4 – Ability to recognize the individual and collective responsibility of engineering and its interventions on society and the environment.
- EP.2 – Understands concepts of project management.

Important Dates

- **Assignment #1 due**
January 26, 2024
- **Term Test-1**
February 02, 2024
- **Assignment #2 due**
February 16, 2024
- **Louis Riel Day**
Feb. 19, 2024
No classes or examinations
- **Winter term break**
Feb. 19 - 23, 2024
- **Term Test-2**
March 01, 2023
- **Assignment #3 due**
March 8, 2024
- **Voluntary Withdrawal (VW)**
Mar. 20, 2024
- **Term Test-3**
March 22, 2024
- **Good Friday**
Mar. 29, 2024
No classes or examinations
- **Assignment #4 due**
April 5, 2024
- **Term Test-4**
April 10, 2024
- **Last Day of Classes**
Apr. 10, 2024

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 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.

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.

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 *Copyright Office*

