University of Manitoba
Faculty of Agricultural & Food Sciences
Department of Biosystems Engineering

Course Details

Course Title & Number:	BIOE 7350 – Bioresource Engineering and Sustainability
Number of Credit Hours:	3
Class Times & Days of Week:	11:30am-12:45pm Tuesdays and Thursdays Fall Term 202
Location for classes:	Room 310 St. Paul's College
Pre-Requisites:	None

Course Description:

Students will gain an understanding of overall sustainability of industrial activities, energy usage, agriculture and natural resources. They will be introduced to societal attitudes and environmental emissions as they relate to climate change and waste generation. The concepts of life-cycle assessment, appropriate design, and resource conservation will be explained. Management of industrial and natural systems for sustainability will be discussed from a multitude of examples.

Instructor Information

Instructor(s) Name:	Dr. Joe Ackerman Research Associate, Manager of SiAF
Office Location:	Sustainability in Action Facility (SiAF) and E1 348 Tel: 204-891-0115
Office Hours:	Thursday mornings 9:00 to 11:00
Email:	Joe.Ackerman@umanitoba.ca
Contact:	You may contact me by email. Emails sent after business hours will not likely be answered until the next day.
Teaching Assistant:	None

Course Goals

The intent of this course is to:

- introduce students to sustainability concepts around energy/materials use, environmental emissions with a focus on climate change
- provide students with an understanding of waste management and related impacts
- familiarize students with life-cycle assessment tools for engineering applications
- have students appreciate the importance of sustainable development and a healthy environment

- provide students with the concept of unintended consequences

No Required Textbook

Reference Materials

Allen and Shonnard. 2012. Sustainable Engineering: concepts, design, and case studies. New Jersey, NJ: Prentice Hall. ISBN: 978-0-13-275654-9

Huff, Darrell 1954. How to lie with statistics. W. W. Norton Company, New York. Isbn:0-393-31072-8

Morris and Therivel. 2009. Methods of Environmental Impact Assessment, 3rd edition. New York, NY: Routledge. ISBN: 978-0-415-44174

Berry, Wendell. 1992. Sex, economy, freedom & community. Pantheon Books. New York and San Francisco.

Shatzker, Mark. The Dorito Effect. 2016. Simon & Shuster. ISBN 1476724245, 9781476724249

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. The content used is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by us, are made available for private study and research and must not be distributed in any format without permission.

Course Technology

This course will be managed through UMLearn. Course materials (PowerPoint slides, reading materials, video clips, etc.) will be distributed through the UM Learn course site.

Class Communication

The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit:
http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf

Expectations of the Instructor

Create an environment that facilitates student engagement and learning. In this course, most dissemination of information will occur using the traditional lecture format, based on PowerPoint presentations. However, some reading and viewing materials will be distributed which will be followed by classroom discussions.

Expectations of the Student

Be in attendance, and on time, for all scheduled lectures. There will be at least one in-class quiz on previous lecture material. To benefit the most from this class, you must be willing to participate in class discussions. Deadlines are a reality in the world of engineering; assignments are expected to be completed on time.

Academic Integrity:

Plagiarism or any other form of cheating on assignments or academic work is subject to serious academic penalty. Cheating in the form of copying from another student, unauthorized collaborative work, copying from internet sources, secret AI usage or contract submission are not allowed. Students should acquaint

themselves with the University's policy on plagiarism, cheating, exam impersonation and duplicate submission. Electronic detection tools may be used to screen assignments in cases of suspected plagiarism.

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.

Lecture Content:

Week 1: Course introduction and discussion on assignments. Bonus: Cold weather clothing
Week 2: Green House Gases
Week 3**:** Refrigerants and halo carbons
Week 4: Carbon and Carbon Offsets
Week 5: It's not Waste unless it's Wasted; Landfill design and organic wastes
Week 6: Recycling: The Problem Child**;** Plastic recycling and PFAS contamination
Week 7: Life-cycle Assessment for Sustainability
Week 8: Waste/Feedstock integrated Industrial Parks
Week 9: The Sustainable construction in cold climates; Nutrients
Week 10: Sustainable Agriculture; Forestry
Week 11: Good Work; Fishing and the Commons
Week 12: Student presentations
Week 13: Unfinished topics

Course Evaluation Methods

The assignments listed below were from previous years and are given here as a sample. 2024 assignments and evaluation methods are currently under review to fortify them against AI assistance (i.e., cheating) and will be finalized as the course commences. There will likely be two in-class Quizzes on lecture material.

Previous Assignment Descriptions

Assignment #1 (15%): Students will be asked to compile a short review on an assigned greenhouse gas. This will include its GWP, atmospheric concentration, degradation rate, uses and any restrictions on production or use. Students must include analysis of relative impact from their compound and possible alternatives. A short oral presentation of the key findings will be made to the class and data will be combined with those of other GHGs to form a global atmospheric concentration of CO2 equivalents.

Assignment #2 (35%): Students will be asked to design and scale an industrial park in which the industries utilize the wastes generated by compatible industries to create an integrated loop of circularity where the wastes from one industry are the feedstock for another.

Assignment #3 (25%): Students will have to compare MSW implementation between cities

Quizzes (2 x 12.5%)

Assignment Rubrics and Late Submissions

Rubrics will be determined for each assignment and posted in the UMLearn site along with the Assignment. A penalty of 10% per day is imposed on late submissions. To keep a level playing field, there will be no extensions except under dire circumstances.