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 2022
Location for classes:	Room 419 Machray Hall
Pre-Requisites:	None

Course Description:
Students will gain an understanding of overall sustainability of industrial activities, energy usage, agriculture and natural resource depletion. They will be introduced to environmental emissions as they relate to air and water pollution, 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.

Instructor Information

Instructor(s) Name:	Dr. Joe Ackerman Research Associate, Manager of SiAF
Office Location:	Sustainability in Action Facility (SiAF) Tel: 204-891-0115
Office Hours:	Thursday mornings
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 and environmental emissions
- 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 an understanding of social and economic effects of new developments

Reference Materials

Allen and Shonnard. 2012. Sustainable Engineering: concepts, design, and case studies. New Jersey, NJ: Prentice Hall. 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

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

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

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: You Can Expect Me To

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: We Expect You To

Be in attendance, and on time, for all scheduled lectures. Lectures will be on Tuesdays and Thursdays will be interactive discussions. 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 or contract submission. 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. A walk and tour of the SiAF site.
Week 2: Green House Gases
Week 3**:** The Plastic Tour of 2022 and Research Methods
Week 4: It's not Waste unless it's Wasted: a look at Waste Production and Utilization.
Week 5: Recycling: The Problem Child
Week 6: Possible site tour
Week 7: Life-cycle Assessment for Sustainability
Week 8: The Sustainable House in Winnipeg. Energy Retrofits for Cold Climates.
Week 9: Conservation and Good Work
Week 10: Fall-Term Break
Week 11: Sustainable Agriculture
Week 12: Sustainable Fishing and Forestry
Week 13: Unfinished topics

Course Evaluation Methods

The grade for this course will be based on 4 written assignments equally valued at 25%. Written assignments should not exceed 5 pages double-spaced, 12 point font. References and figures can be in excess of this. Assignments submitted after the due date will be docked 10% per day.

Assignment Descriptions

Note: additional description is in the Assignment folder.

Assignment #1 (25%): Students will be asked to write a short review on an assigned greenhouse gas. This will include its GWP, atmospheric concentration, degradation rate, uses, and annual production. Students must include analysis of relative impact from their compound and possible alternatives. Data will be combined with those of other GHGs to form a global atmospheric concentration of CO2 equivalents.

Assignment #2 (25%): Students will be asked to design an industrial park in which the industries utilize the wastes generated by compatible industries to create an integrated loop of circularity.

Assignment #3 (25%): Students will have to compare historical and present day agricultural sustainability of a chosen location.

Assignment #4 (25%): Students will be asked to write a short review article on a carbon sequestration technology of their choice and can choose an industrial (e.g., CO2 capture from atmosphere) or a natural one (e.g., soil organic carbon).

Assignment Rubrics

Rubrics will be determined for each assignment and posted in the UMLearn site.