Product Life Cycle Assessment and Management
ENBUS 622

Syllabus

Course Schedule

IMPORTANT: ALL TIMES EASTERN - Please see the University Policies section of your Syllabus for details

Week	Topic	Course Requirements and Important Dates			
		Activities and Assignments	**Start Date**	**End/Due Date**	**Weight (%)**
Week 1	Introduction to the ISO Standards for LCA 14040/14044	Groups for Discussion Postings will be created by the Instructor		Check after Friday, September 7, 2018 at 4:30 PM	
		Discussion Posting 1 (Week 1)	Thursday, September 6, 2018	Thursday, September 13, 2018 at 11:59 PM	**2%**
		Begin reading from the All Course Readings list		Weekly	
Week 2	Goal and Scope Definition (Part 1)	Begin LCA Report and Modeling Assignment - Part 1	Thursday, September 13, 2018		
		Continue All Course Readings list		Weekly	
Week 3	Goal and Scope Definition (Part 2)	Synchronous Feedback Session (Skype or call). See Contact Information page for further details.			
		Begin Critical Review Assignment	Thursday, September 20, 2018		
		Continue All Course Readings list		Weekly	
Week 4	Life Cycle Inventory (Part 1)	Continue working on LCA Report and Modeling Assignment - Part 1			
		Continue All Course Readings list		Weekly	
Week 5	Life Cycle Inventory (Part 2)	Discussion Posting 2 (Week 5)	Thursday, October 4, 2018	Thursday, October 11, 2018 at 11:59 PM	**4%**
		Continue working on LCA Report and Modeling Assignment - Part 1			
		Continue Critical Review Assignment			
	Fall Break - Study Days (Tuesday, October 9, 2018 and Wednesday, October 10, 2018)				
Week 6	Life Cycle Impact	Continue Critical Review Assignment			

	Assessment (Part 1)	Continue working on LCA Report and Modeling Assignment - Part 1			
		Continue All Course Readings list		Weekly	
Week 7	Life Cycle Impact Assessment (Part 2)	Submit LCA Report and Modeling Assignment - Part 1		Tuesday, October 30, 2018 at 11:59 PM	**15%**
		Continue All Course Readings list		Weekly	
Week 8	Life Cycle Interpretation	Begin LCA Report and Modeling Assignment - Part 2	Tuesday, October 30, 2018		
		Discussion Posting 3 (Week 8)	Tuesday, October 30, 2018	Tuesday, November 6, 2018 at 11:59 PM	**2%**
		Submit Critical Review Assignment		Tuesday, November 6, 2018 at 11:59 PM	**25%**
		Continue All Course Readings list		Weekly	
Week 9	Work on LCA Report and Modeling Assignment	Discussion Posting 4 (Week 9)	Thursday, November 8, 2018	Thursday, November 15, 2018 at 11:59 PM	**3%**
		Continue working on LCA Report and Modeling Assignment - Part 2			
Week 10	Attributional and Consequential Life Cycle Analysis	Continue working on LCA Report and Modeling Assignment - Part 2			
		Continue All Course Readings list		Weekly	
Week 11	LCA, Life Cycle Management, and Sustainability	Discussion Posting 5 (Week 11)	Tuesday, November 20, 2018	Tuesday, November 27, 2018 at 11:59 PM	**4%**
		Continue working on LCA Report and Modeling Assignment - Part 2			
		Continue All Course Readings list		Weekly	
Week 12	Work on LCA Report and Modeling Assignment	Submit LCA Report and Modeling Assignment - Part 2		Monday, December 3, 2018 at 11:59 PM	**45%**

Final Examination Arrangements and Schedule

There is no final examination for this course.

Official Grades and Course Access

Official Grades and Academic Standings are available through Quest.

Your access to this course will continue for the duration of the current term. You will not have access to this course once the next term begins.

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Contact Information

Announcements

Your instructor uses the **Announcements** widget on the **Course Home** page during the term to communicate new or changing information regarding due dates, instructor absence, etc., as needed. You are expected to read the announcements on a regular basis.

To ensure you are viewing the complete list of announcements, you may need to click **Show All Announcements**.

Discussions

A **General Discussion** topic* has also been made available to allow students to communicate with peers in the course. Your instructor may drop in at this discussion topic.

Contact Us

Who and Why	Contact Details
Instructor ○ Course-related questions (e.g., course content, deadlines, assignments, etc.) ○ Questions of a personal nature	**Post your course-related questions** to the **Ask the Instructor** discussion topic*. This allows other students to benefit from your question as well. **Questions of a personal nature** can be directed to your instructor. Instructor: Dr. Goretty Dias gdias@uwaterloo.ca TA: Edis Glogic eglogic@uwaterloo.ca Your instructor checks email and the **Ask the Instructor** discussion topic* frequently and will make every effort to reply to your questions within 24–48 hours, Monday to Friday.
Technical Support, Centre for Extended Learning ○ Technical problems with Waterloo LEARN	learnhelp@uwaterloo.ca Include your full name, WatIAM user ID, student number, and course name and number. Technical support is available during regular business hours, Monday to Friday, 8:30

	AM to 4:30 PM (Eastern Time).
	LEARN Help Student Documentation

Learner Support Services, Centre for Extended Learning
 	
    ○ General inquiries
 	
    ○ WatCards (Student ID Cards)
 	
    ○ Examination information
	Student Resources
	
	extendedlearning@uwaterloo.ca
	+1 519-888-4002
	
	Include your full name, WatIAM user ID, student number, and course name and number.

*Discussion topics can be accessed by clicking **Connect and then **Discussions** on the course navigation bar above.

Synchronous Feedback Sessions

Due to the nature of the assignments in this course (project based), it is important that you receive formative feedback to help guide the progress of your "LCA Report and Modeling Assignment." As such, you will need to email your instructor to set up synchronous feedback sessions. (The Course Schedule outlines the specific week this is required.) You will complete this assignment either as an individual or as part of a group; therefore, you may need to coordinate your synchronous feedback session with others. Your instructor will post further details as an **Announcement** item at the start of term.

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About the Course Instructor and Author

Course Instructor and Author - Dr. Goretty Dias

Educational Background

Ph.D. Atmospheric Science, University of Guelph

B.Sc. Physical Geography, University of Guelph

Employment Background

Goretty obtained a B.Sc. in Physical Geography and a Ph.D. in Atmospheric Science from the University of Guelph, and conducted her post-doctoral work in Environmental Engineering. She worked for five years in consulting, in work related to LCA of agriculture, and renewable energy, and social and environmental responsibility in metal supply chains. Her areas of research include: environmental modeling and management, including LCA; bioenergy and biofuels; sustainable agriculture and food systems; social and environmental responsibility in supply chains. She is currently an Assistant Professor in SEED at the University of Waterloo.

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Course Description and Objectives

Course Description

Life Cycle Assessment (LCA) is one of many environmental management tools that examines and assesses environmental impacts associated with products and systems. LCA is a "cradle-to-grave" approach, as it considers the environmental inputs (materials and energy) and outputs (emissions) related to a product or service, from the time the raw materials are extracted to make product, to its final disposal. It has become an important tool used by businesses and governments to improve the environmental performance of products and services, and can be used to support decisions on product development, eco-labelling, policy and planning, and technology assessment, to name a few.

This course introduces the concepts of life cycle assessment (LCA) based on the ISO standards (ISO 14040/14044/14048) and provides an understanding of the uses of LCA, and the limitations and appropriate applications of this methodology. Although the main focus of the course is to learn the mechanics of conducting an LCA, the course also addresses the organizational, management, and policy aspects of LCA. Students will be evaluated on the understanding and application of LCA concepts for conducting a review of LCA studies as well as a LCA modeling project.

Learning Objectives

By the successful end of this course you should be able to

1. identify and explain the 4 phases of LCA according to ISO 14040/14044 LCA standards;
2. describe and explain general challenges in the application of each phase of the LCA framework and critically evaluate the strengths and limitations of the LCA methodology;
3. critically evaluate LCA studies for adherence to ISO standards and best practices;
4. plan and develop a report describing the LCA procedure for analyzing a product or service;
5. implement the LCA procedure for analyzing impacts of a product or service;
6. articulate the relationship between the product life cycle and resource use and environmental impacts;
7. critically evaluate how LCA and Life Cycle Management (LCM) can help society achieve sustainability; and
8. demonstrate timely and effective participation in virtual teamwork, peer-learning, and online activities.

This online course was developed by Dr. Goretty Dias, with instructional design and multimedia development support provided by the Centre for Extended Learning.

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Materials and Resources

Textbook:

Required textbook

Baumann, H., & Tillman, A. (2004). *The Hitch Hiker's Guide to LCA*. Studentlitteratur AB.

Reference material

Instructions: Finding Standards & Codes: What is a Standard?

ISO Standards

1. CAN/CSA-ISO 14040-06. 2006. Environmental Management - Life Cycle Assessment - Principles and Framework (Adopted ISO 14040:2006, second edition, 2006-07-01), Canada National Standard/Canadian Standards - ISO / 01-Dec-2006/38 pages.

2. CAN/CSA-ISO 14044-06. 2006. Environmental Management - Life Cycle Assessment - Requirements and Guidelines (Adopted ISO 14044:2006, first edition, 2006-07-01), Canada National Standard/Canadian Standards - ISO/01-Dec-2006/64 pages.

3. CAN/CSA-ISO 14048: 2002. 2002. Environmental Management - Life Cycle Assessment - Data Documentation Format (Adopted ISO/TS 14048:2002, first edition, 2002-04-01), Canada National Standard/Canadian Standards - ISO/TS 14048:2002(E)

For textbook ordering information, please contact the Waterloo Bookstore.

For your convenience, you can compile a list of required and optional course materials through BookLook using your Quest userID and password. If you are having difficulties ordering online and wish to call the Waterloo Bookstore, their phone number is +1 519-888-4673 or toll-free at +1 866-330-7933. Please be aware that textbook orders **CANNOT** be taken over the phone.

Course Reserves

Course Reserves can be accessed using the **Library Resources** widget on the **Course Home** page.

Resources

- Library services for co-op students on work term and distance education students
- Academic Integrity for Graduate Students
    - Plagiarism
    - Collaboration
    - Cheating

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Grade Breakdown

The following table represents the grade breakdown of this course.

Assignment Components	Breakdown of values (if applicable)	Weight
Discussion Postings	- Discussion Posting 1 (Week 1) = 2% - Discussion Posting 2 (Week 5) = 4% - Discussion Posting 3 (Week 8) = 2% - Discussion Posting 4 (Week 9) = 3% - Discussion Posting 5 (Week 11) = 4%	15%
LCA Report and Modeling Assignment (Group or Individual)	- Part 1 = 15% - Part 2 = 45%	60%
Critical Review Assignment (Individual)		25%

Late Policy

All assignments are due on the date and time indicated. Late assignments (without penalty) are permitted only when specifically allowed by the instructor. Late assignments will be penalized by 20% for the first week it is late and by 50% if submitted prior to the end of the course. Permission may be obtained in advance for late assignments (with no penalty), but this must occur by email at least 3 days PRIOR to the assignment deadline.

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Course and Department Policies

Course Policies

This course *requires* regular access to the Waterloo LEARN course site. Your instructor will use this site for communicating important information concerning course matters, returning graded assignments, etc. A reliable internet connection and regular checking of the course site (at least twice a week) is therefore *mandatory*.

Late Policy

All assignments are due on the date and time indicated. Late assignments (without penalty) are permitted only when specifically allowed by the instructor. Late assignments will be penalized by 20% for the first week it is late and by 50% if submitted prior to the end of the course. Permission may be obtained in advance for late assignments (with no penalty), but this must occur by email at least 3 days PRIOR to the assignment deadline.

Department Policy

Citation Style

Please note that all Master of Environment and Business courses use the 6th edition of the American Psychological Association (APA) style guide.

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University Policies

Submission Times

Please be aware that the University of Waterloo is located in the **Eastern Time Zone** (GMT or UTC-5 during standard time and UTC-4 during daylight saving time) and, as such, the time that your activities and/or assignments are due is based on this zone. If you are outside the Eastern Time Zone and require assistance with converting your time, please try the Ontario, Canada Time Converter.

Accommodation Due to Illness

If your instructor has provided specific procedures for you to follow if you miss assignment due dates, term tests, or a final examination, adhere to those instructions. Otherwise:

Missed Assignments/Tests/Quizzes

Contact the instructor as soon as you realize there will be a problem, and preferably within 48 hours, but no more than 72 hours, have a medical practitioner complete a Verification of Illness Form.

Email a scanned copy of the Verification of Illness Form to your instructor. In your email to the instructor, provide your name, student ID number, and exactly what course activity you missed.

Further information regarding Management of Requests for Accommodation Due to Illness can be found on the Accommodation due to illness page.

Missed Final Examinations

If this course has a final exam and if you are unable to write a final examination due to illness, seek medical treatment and have a medical practitioner complete a Verification of Illness Form. Email a scanned copy to the Centre for Extended Learning (CEL) at extendedlearning@uwaterloo.ca within 48 hours of your missed exam. Make sure you include your name, student ID number, and the exam(s) missed. You will be REQUIRED to hand in the original completed form before you write the make-up examination.

After your completed Verification of Illness Form has been received and processed, you will be emailed your alternate exam date and time. This can take up to 2 business days. If you are within **150 km** of Waterloo you should be prepared to write in Waterloo on the additional CEL exam dates. If you live outside the 150 km radius, CEL will work with you to make suitable arrangements.

Further information about Examination Accommodation Due to Illness regulations is available in the Undergraduate Calendar.

Academic Integrity

In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect, and responsibility. **If you have not already completed the online tutorial regarding academic integrity you should do so as soon as possible.** Undergraduate students should see the Academic Integrity Tutorial and graduate students should see the Graduate Students and Academic Integrity website.

Proper citations are part of academic integrity. Citations in CEL course materials usually follow CEL style, which is based on APA style. Your course may follow a different style. If you are uncertain which style to use for an assignment, please confirm with your instructor or TA.

For further information on academic integrity, please visit the Office of Academic Integrity.

Turnitin

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin® in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit the alternate assignment.

Discipline

A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration, should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71 - Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.

Appeals

A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances, (other than a petition) or Policy 71 - Student Discipline, may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 - Student Appeals.

Grievance

A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4. When in doubt please

be certain to contact the department's administrative assistant who will provide further assistance.

Final Grades

In accordance with [Policy 46 - Information Management](), Appendix A - Access to and Release of Student Information, the Centre for Extended Learning does not release final examination grades or final course grades to students. Students must go to [Quest]() to see all final grades. Any grades posted in Waterloo LEARN are unofficial.

AccessAbility Services

[AccessAbility Services](), located in Needles Hall, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodation to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term and for each course.

Accessibility Statement

The Centre for Extended Learning strives to meet the needs of all our online learners. Our ongoing efforts to become aligned with the [Accessibility for Ontarians with Disabilities Act (AODA)]() are guided by University of Waterloo accessibility [Legislation]() and policy and the [World Wide Web Consortium's (W3C) Web Content Accessibility Guidelines (WCAG) 2.0](). The majority of our online courses are currently delivered via the Desire2Learn Learning Environment. Learn more about [Desire2Learn's Accessibility Standards Compliance]().

Use of Computing and Network Resources

Please see the [Guidelines on Use of Waterloo Computing and Network Resources]().

Copyright Information

UWaterloo's Web Pages

All rights, including copyright, images, slides, audio, and video components, of the content of this course are owned by the course author, unless otherwise stated. These web pages are owned or controlled by the University of Waterloo, Centre for Extended Learning. By accessing the web pages, you agree that you may only download the content for your own personal, non-commercial use. You are not permitted to copy, broadcast, download, store (in any medium), transmit, show or play in public, adapt, or change in any way the content of these web pages for any other purpose whatsoever without the prior written permission of the course author and the University of Waterloo, Centre for Extended Learning.

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If there are any questions about this notice, please contact the University of Waterloo, Centre for Extended Learning, Waterloo, Ontario, Canada, N2L 3G1 or extendedlearning@uwaterloo.ca.

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