Module descriptor

Module code:	ENGM253
Module title:	Life Cycle Assessment
FHEQ level:	7
Module Leader:	Jhuma Sadhukhan
Other contributors:	Richard Murphy
Number of credits:	15
Number of ECTS credits:	7.5
Module availability:	Semester 2
Overall student workload:	150 hours
Date of production/revision of the descriptor:	19 July 2017

Assessment pattern

Units of assessment	Weighting towards module mark (%)
Pre-course individual foundation concepts quiz	20%
LCA group exercise during module week	20%
Individual post-module report	60%

Alternative assessment:
Resubmission of 'Pre-course individual foundation concepts quiz' if failed
Individual report alternative to 'LCA group exercise during module week' if failed
Resubmission of 'Individual post-module report' if failed

Qualifying condition(s)
A weighted aggregated mark of 50% is required to pass the module.

Pre-requisite/co-requisites

None

Module overview

To build understanding of life cycle assessment (LCA) methodology developed in the Life Cycle Thinking module by providing more in-depth training on LCA methodology and practical experience of doing a LCA. Students will be encouraged to take ENGM058 Life Cycle Thinking module.

Module aims

This module aims:

- Understand all four stages of the LCA methodology
- Be aware of the resources required to do a LCA study in practice
- Be able to provide a critical perspective on the quality of a LCA study done by others
- Understand the key benefits and challenges of the application of LCA for a range of purposes

Learning outcomes

On completion of this module, students will be able to:

- Demonstrate understanding of the LCA methodology (C)
- Be aware of the resources required to do a LCA study in practice (K)
- Be able to provide a critical perspective on the quality of a LCA study done by others – peer review skill (P)
- Understand the key benefits and challenges of the application of LCA for a range of purposes (T)
- Undertaking of practical LCA (T, P)

Key: C-Cognitive/Analytical; K-Subject Knowledge; T-Transferable Skills; P- Professional/ Practical skills

Module content

The module will cover a detailed overview LCA methodology including impact assessment and management of uncertainty; practical experience of executing an LCA using commercial software; exposure to a range of resources available to do LCA (inventory databases, life cycle impact assessment (LCIA) methods, etc.).

Methods of teaching/learning

The learning and teaching strategy is designed to take an active learning approach, in which the students are engaged in class exercises and discussions. The learning and teaching methods include preparatory reading and exercises; lectures, hands-on LCA study, group discussions and exercises to do an LCA:

- Preparatory reading (~10 hours);
- Lectures (~12 hours)
- Hands-on LCA study and group discussions (~18 hours)
- Post course study and assignment (~110 hours)

Assessment strategy

The assessment strategy is designed to provide students with the opportunity to demonstrate the ability to conduct research in the scientific literature and thus build upon concepts introduced in the module's lectures.

The summative assessment for this module consists of:
Pre-course individual foundation concepts quiz (20%)
LCA group exercises during module week (20%)
Individual post-module report (60%)

Formative assessment and feedback
Students will receive qualitative feedback (and marks) on every piece of summative assessment.

Reading list

Essential reading
Textbook: Sadhukhan, J., Ng, K.S. and Martinez-Hernandez, E. (2014). *Biorefineries and Chemical Processes: Design, Integration and Sustainability Analysis*, Wiley, ISBN-10: 1119990866 | ISBN-13: 978-1119990864 | Edition: 1.

Recommended reading
- Baumann, H. and Tillman, A.-M. (2004).*The Hitch Hiker's Guide to LCA : An Orientation in Life Cycle Assessment Methodology and Application*, Studentlitteratur, Lund, Sweden
- European Commission - Joint Research Centre - Institute for Environment and Sustainability (2010). *International Reference Life Cycle Data System (ILCD) Handbook - General Guide for Life Cycle Assessment - Detailed Guidance*. Publications Office of the European Union, Luxembourg
- USA-TRACI "Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts" method is available on the internet
- CML database (Institute of Environmental Sciences; Leiden University, Netherlands), available on the internet
- Journals with discussions on LCA methodology and case studies including *International Journal of Life Cycle Assessment, Journal of Cleaner Production, Journal of Industrial Ecology, Environmental Science & Technology, Biomass & Bioenergy, Applied Energy, etc.*

Background reading
None