Course guide
390456 - LCA - Life-Cycle Assessment of Products and Processes

Last modified: 26/05/2026

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: BACHELOR'S DEGREE IN AGRICULTURAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN AGRICULTURAL, ENVIRONMENTAL AND LANDSCAPE ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Optional subject).
BACHELOR'S DEGREE IN LANDSCAPE ARCHITECTURE (Syllabus 2019). (Optional subject).

Academic year: 2026 **ECTS Credits:** 6.0 **Languages:** English

LECTURER

Coordinating lecturer: CARLOS ANTONIO RAMOS QUIROZ

Others: ERICA YVONNE MONTEMAYOR - Grup: OP/1

PRIOR SKILLS

English level: higher intermediate (B2, FCE) or advanced (C1, CAE)

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE-BC-17. Decision taking by assessment of available resources in multidisciplinary work-teams.
CE-BC-2. Fundamentals of computer use and programming, operating systems, data bases, software for engineering applications.

Generical:
CG-3L3. (ENG) TERCERA LLENGUA NIVELL 3: defensar en públic en anglès un treball elaborat per escrit en aquesta llengua relacionat amb l'àrea d'estudi
CG-SCS. SUSTAINABILITY AND SOCIAL COMMITMENT
CG-3L2. (ENG) TERCERA LLENGUA, NIVELL 2: redactar un text en anglès relacionat amb l'àrea d¿estudi i ser capaç de formular i respondre qüestions, tant per escrit com oralment, sobre el mateix
CG-3L1. (ENG) TERCERA LLENGUA NIVELL 1: comprendre un text en anglès relacionat amb l'àrea d'estudi i
ser capaç de respondre qüestions relacionades amb el mateix

TEACHING METHODOLOGY

This course will provide students with the necessary knowledge on the fundamentals of the Life Cycle Assessment (LCA) and provide the practical skills to carry out a LCA.

Students will complete an individual coursework (LCA project).

At the end of the course, each student will present their LCA project to the class, and hand in their written LCA report.

Finally, one exam in January will be used to ensure that knowledge on the subject has been successfully achieved.

LEARNING OBJECTIVES OF THE SUBJECT

- To describe the fundamentals of LCA, including its four main phases and LCA report content

- To carry out a LCA project by:
o Compiling an inventory of relevant energy and material inputs and environmental releases
o Evaluating the potential impacts associated with identified inputs and releases
o Interpreting the results
o Writing the LCA report according to ISO Standards

- To Identify the potential and limitations of LCA in practice

- To apply LCA results to support decision making

STUDY LOAD

Type	Hours	Percentage
Hours large group	60,0	40.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

1. Life Cycle Assessment

Description:
- Introduction and overview
- Goal and scope
- Goal definition
- Scope definition
- Functional Unit
- System boundaries
- Data quality requirement
- Comparison of different systems
- Life Cycle Inventory
- Inventory analysis
- Data collection and processing
- Impact assessment
- Classification
- Characterization
- Normalization
- Weighting
- Methods
- Interpretation
- Sensitivity analysis
- ISO
- LCA Report

Specific objectives:
- To describe the fundamentals of LCA, including its four main phases and LCA report content

Related activities:
- Coursework: LCA of a 3-course menu
- Coursework presentation

Related competencies :
CG-SCS. SUSTAINABILITY AND SOCIAL COMMITMENT
CG-3L2. (ENG) TERCERA LLENGUA, NIVELL 2: redactar un text en anglès relacionat amb l'àrea d¿estudi i ser capaç de formular i respondre qüestions, tant per escrit com oralment, sobre el mateix

Full-or-part-time: 35h
Theory classes: 17h 30m
Guided activities: 17h 30m

2. Single issue indicators

Description:
- Carbon footprint
- Water footrpint
- Biodiversity

Specific objectives:
- To describe the fundamentals of LCA, including its four main phases and LCA report content
- To Identify the potential and limitations of LCA in practice

Related competencies :
CG-SCS. SUSTAINABILITY AND SOCIAL COMMITMENT
CG-3L1. (ENG) TERCERA LLENGUA NIVELL 1: comprendre un text en anglès relacionat amb l'àrea d'estudi i ser capaç de respondre qüestions relacionades amb el mateix

Full-or-part-time: 15h
Theory classes: 15h

3. SimaPro

Description:
- Overview and software interface description
- Database and Methods (Libraries)
- Create Processes
- Create assembly
- Waste scenario
- Impact analysis and results (table and charts)
- Allocation
- Sensitivity analysis and parameters

Specific objectives:
- Learn how to use SimaPro software in order to:
- Search through databases
- Build your own inventories
- Analyse and interpret the results

Related competencies :
CG-3L3. (ENG) TERCERA LLENGUA NIVELL 3: defensar en públic en anglès un treball elaborat per escrit en aquesta llengua relacionat amb l'àrea d'estudi
CG-SCS. SUSTAINABILITY AND SOCIAL COMMITMENT
CE-BC-2. Fundamentals of computer use and programming, operating systems, data bases, software for engineering applications.
CE-BC-17. Decision taking by assessment of available resources in multidisciplinary work-teams.

Full-or-part-time: 5h
Theory classes: 5h

GRADING SYSTEM

Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the **Action Framework for Academic Integrity in Assessment at the UPC**.

- N1= Test: 40%
- N2= Individual coursework: 60%, divided into:
o Final oral presentation: 15%
o Dissertation: 45%
NFinal= N1 + N2

BIBLIOGRAPHY

Basic:

- European Commission-Joint Research Centre - Institute for Environment and Sustainability. International Reference Life Cycle Data System (ILCD) Handbook - General guide for Life Cycle Assessment - Detailed guidance [on line]. 1. Luxembourg: Publications Office of the European Union, 2010 [Consultation: 16/04/2020]. Available on: http://eplca.jrc.ec.europa.eu/uploads/ILCD-Handbook-General-guide-for-LCA-DETAILED-GUIDANCE-12March2010-ISBN-fin-v1.0-EN.pdf.
- Xarxa Temàtica Catalana d'ACV. Llibre didàctic d'anàlisi del cicle de vida (ACV) [on line]. 1. Barcelona, 2002 [Consultation: 16/07/2022]. Available on: https://mediambient.gencat.cat/web/.content/home/ambits_dactuacio/empresa_i_produccio_sostenible/estrategia_ecodisseny/ecodisseny/eines/eines_avalucio/llibre_acv.pdf.
- Mark Goedkoop, Michiel Oele, Jorrit Leijting, Tommie Ponsioen, Ellen Meijer. Introduction to LCA with SimaPro [on line]. 2013 [Consultation: 16/04/2020]. Available on: https://www.pre-sustainability.com/download/SimaPro8IntroductionToLCA.pdf.

Complementary:

- "Environmental management -- Life cycle assessment -- Principles and framework". International Organization for Standardization [on line]. 2006. ISO 14040:2006 [Consultation: 16/04/2020]. Available on: http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=37456.- "Environmental management -- Life cycle assessment -- Requirements and guidelines". International Organization for Standardization [on line]. 2006. ISO 14044:2006 [Consultation: 16/04/2020]. Available on: http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=38498.- "Environmental management Water footprint Principles, requirements and guidelines". International Organization for Standardization [on line]. 2014. ISO 14046:2014 [Consultation: 16/04/2020]. Available on: http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=43263.- "Environmental management systems Guidelines for incorporating ecodesign.". International Organization for Standardization [on line]. 2011. ISO 14006:2011 [Consultation: 16/04/2020]. Available on: http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=43241.- "Greenhouse gases Carbon footprint of products Requirements and guidelines for quantification and communication". International Organization for Standardization [on line]. 2013. ISO/TS 14067:2013 [Consultation: 16/04/2020]. Available on: http://www.iso.org/iso/home/search.htm?qt=ISO+14067&published=on&active_tab=standards&sort_by=rel.

RESOURCES

Hyperlink:

- SimaPro Demo. http://www.pre-sustainability.com/simapro-demo