

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

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| Coordinating unit: | 390 - ESAB - Barcelona School of Agricultural Engineering |
| Teaching unit: | 751 - DECA - Department of Civil and Environmental Engineering |
| Academic year: | 2019 |
| Degree: | BACHELOR'S DEGREE IN LANDSCAPE ARCHITECTURE (Syllabus 2019). (Teaching unit Optional) BACHELOR'S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Teaching unit Optional) BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN AGRICULTURAL ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN AGRICULTURAL, ENVIRONMENTAL AND LANDSCAPE ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Optional) |
| ECTS credits: | 6 |
| Teaching languages: | English |

Teaching staff

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| Coordinator: | Ferrer Marti, Ivet |
| Others: | Garfi, Marianna Uggetti, Enrica |

Opening hours

Timetable: Before and after each lecture, also by e-mail.

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.

Generic:

CG-3L3. (ENG) TERCERA LENGUA 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 LENGUA, 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 LENGUA NIVELL 1: comprendre un text en anglès relacionat amb l'àrea d'estudi i ser capaç de respondre qüestions relacionades amb el mateix

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Teaching methodology

During the first part of the course, lectures will provide background information and the fundamentals of the subject (LCA).

Invited speakers will share their expertise on two specific topics: Carbon footprint and Water footprint.

Students will be organised in groups of 2-4 people for the coursework (LCA project).

The second part of the course will be focussed on the coursework that each group will undertake with the software SimaPro (1 month license).

At the end of the course each group will present the LCA project to the rest, and hand in the LCA report.

Finally, a test 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

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|---------------------------|---------------------|-----|--------|
| Total learning time: 150h | Hours large group: | 60h | 40.00% |
| | Hours medium group: | 0h | 0.00% |
| | Hours small group: | 0h | 0.00% |
| | Guided activities: | 0h | 0.00% |
| | Self study: | 90h | 60.00% |

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Content

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| <h3>1. Life Cycle Assessment</h3> | <p>Learning time: 27h Theory classes: 17h Laboratory classes: 10h</p> |
| <p>Description:</p> <ul style="list-style-type: none"> - Introduction and overview - Goal and scope <ul style="list-style-type: none"> - Goal definition - Scope definition - Functional Unit - System boundaries - Allocation - Data quality requirement - Comparison of different systems - Life Cycle Inventory <ul style="list-style-type: none"> - Inventory analysis - Data collection and processing - Impact assessment <ul style="list-style-type: none"> - Classification - Characterization - Normalization - Weighting - Methods - Interpretation - Sensitivity analysis - ISO - LCA Report <p>Related activities:</p> <ul style="list-style-type: none"> - Coursework: inventory - Initial coursework presentation <p>Specific objectives:</p> <ul style="list-style-type: none"> - To describe the fundamentals of LCA, including its four main phases and LCA report content | |

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| <p>2. Single issue indicators</p> | <p>Learning time: 3h Theory classes: 3h</p> |
| <p>Description:</p> <ul style="list-style-type: none"> - Carbon footprint - Water footprint <p>Related activities:</p> <ul style="list-style-type: none"> - Invited speaker presentation <p>Specific objectives:</p> <ul style="list-style-type: none"> - 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 | |
| <p>3. SimaPro</p> | <p>Learning time: 24h Theory classes: 14h Laboratory classes: 10h</p> |
| <p>Description:</p> <ul style="list-style-type: none"> - 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 <p>Related activities:</p> <ul style="list-style-type: none"> - Coursework: LCA project - Final coursework presentation <p>Specific objectives:</p> <ul style="list-style-type: none"> - To carry out a LCA project by: <ul style="list-style-type: none"> 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 | |

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| 4. Social and economic life cycle assessment | Learning time: 3h Theory classes: 3h |
| <p>Description:</p> <ul style="list-style-type: none"> - Social Life Cycle - Life Cycle Costing <p>Specific objectives:</p> <ul style="list-style-type: none"> - 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 | |
| 5. Ecodesign and Ecolabel | Learning time: 3h Theory classes: 3h |
| <p>Description:</p> <ul style="list-style-type: none"> - Ecodesign - Ecolabel | |

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Planning of activities

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| Initial oral presentation | Hours: 3h Theory classes: 3h |
| <p>Description: Oral presentation of the coursework first stage (inventory) in groups of 2-4 people.</p> <p>Descriptions of the assignments due and their relation to the assessment: - Coursework: inventory</p> <p>Specific objectives: - To carry out a LCA project by: o Compiling an inventory of relevant energy and material inputs and environmental releases</p> | |
| Final oral presentation | Hours: 3h Theory classes: 3h |
| <p>Description: Oral presentation of the coursework (LCA project) in groups of 2-4 people.</p> <p>Descriptions of the assignments due and their relation to the assessment: - Coursework: LCA project</p> <p>Specific objectives: - 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</p> | |

Qualification system

- Test: 40%
- Group coursework: 60%, divided into:
 - o Initial oral presentation: 10%
 - o Final oral presentation: 15%
 - o Dissertation: 35%

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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 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 Available on: <http://mediambient.gencat.cat/web/.content/home/ambits_dactuacio/empresa_i_produccio_sostenible/ecoproductes_i_ecoserveis/acv_revisar/documents/lilibre_acv.pdf>.

Mark Goedkoop, Michiel Oele, Jorrit Leijting, Tommie Ponsioen, Ellen Meijer. Introduction to LCA with SimaPro [on line]. 2013 Available on: <<http://www.pre-sustainability.com/introduction-to-lca>>.

Complementary:

"Environmental management -- Life cycle assessment -- Principles and framework". International Organization for Standardization [on line]. 2006. ISO 14040:2006 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 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 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 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 Available on: <http://www.iso.org/iso/home/search.htm?qt=ISO+14067&published=on&active_tab=standards&sort_by=rel>.

Others resources:

Hyperlink

SimaPro Demo

<http://www.pre-sustainability.com/simapro-demo>