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

**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 BIOSYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Optional)  
BACHELOR'S DEGREE IN AGRICULTURAL, ENVIRONMENTAL AND LANDSCAPE ENGINEERING (Syllabus 2009). (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 AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Teaching unit Optional)  
BACHELOR'S DEGREE IN LANDSCAPE ARCHITECTURE (Syllabus 2019). (Teaching unit Optional)  
**ECTS credits:** 6  
**Teaching languages:** English

## Teaching staff

**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.

### 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

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

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 60h</th>
<th>40.00%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>0h</td>
</tr>
<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
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</tbody>
</table>
# 1. Life Cycle Assessment

## Description:
- Introduction and overview
- Goal and scope
  - Goal definition
  - Scope definition
  - Functional Unit
  - System boundaries
  - Allocation
  - 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

## Related activities:
- Coursework: inventory
- Initial coursework presentation

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

<table>
<thead>
<tr>
<th>Learning time</th>
<th>27h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes</td>
<td>17h</td>
</tr>
<tr>
<td>Laboratory classes</td>
<td>10h</td>
</tr>
</tbody>
</table>
## 2. Single issue indicators

<table>
<thead>
<tr>
<th><strong>Description:</strong></th>
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</thead>
<tbody>
<tr>
<td>- Carbon footprint</td>
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<tr>
<td>- Water footprint</td>
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</tbody>
</table>

**Related activities:**
- Invited speaker presentation

**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

<table>
<thead>
<tr>
<th><strong>Learning time:</strong> 3h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 3h</td>
</tr>
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</table>

## 3. SimaPro

<table>
<thead>
<tr>
<th><strong>Description:</strong></th>
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</thead>
<tbody>
<tr>
<td>- Overview and software interface description</td>
</tr>
<tr>
<td>- Database and Methods (Libraries)</td>
</tr>
<tr>
<td>- Create Processes</td>
</tr>
<tr>
<td>- Create assembly</td>
</tr>
<tr>
<td>- Waste scenario</td>
</tr>
<tr>
<td>- Impact analysis and results (table and charts)</td>
</tr>
<tr>
<td>- Allocation</td>
</tr>
<tr>
<td>- Sensitivity analysis and parameters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Related activities:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Coursework: LCA project</td>
</tr>
<tr>
<td>- Final coursework presentation</td>
</tr>
</tbody>
</table>

**Specific objectives:**
- To carry out a LCA project by:
  - Compiling an inventory of relevant energy and material inputs and environmental releases
  - Evaluating the potential impacts associated with identified inputs and releases
  - Interpreting the results
  - 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

<table>
<thead>
<tr>
<th><strong>Learning time:</strong> 24h</th>
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</thead>
<tbody>
<tr>
<td>Theory classes: 14h</td>
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<tr>
<td>Laboratory classes: 10h</td>
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</table>
### 4. Social and economic life cycle assessment

<table>
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<tr>
<th>Description:</th>
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<tbody>
<tr>
<td>- Social Life Cycle</td>
</tr>
<tr>
<td>- Life Cycle Costing</td>
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</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Learning time: 3h</th>
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<tbody>
<tr>
<td>Theory classes: 3h</td>
</tr>
</tbody>
</table>

### 5. Ecodesign and Ecolabel

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<tr>
<th>Description:</th>
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</thead>
<tbody>
<tr>
<td>- Ecodesign</td>
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<tr>
<td>- Ecolabel</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning time: 3h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 3h</td>
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</table>
## Planning of activities

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

| **Final oral presentation** | **Hours:** 3h  
Theory classes: 3h |
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</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Oral presentation of the coursework (LCA project) in groups of 2-4 people.</td>
</tr>
<tr>
<td><strong>Descriptions of the assignments due and their relation to the assessment:</strong></td>
<td>- Coursework: LCA project</td>
</tr>
</tbody>
</table>
| **Specific objectives:**   | - To carry out a LCA project by:  
  - Compiling an inventory of relevant energy and material inputs and environmental releases  
  - Evaluating the potential impacts associated with identified inputs and releases  
  - Interpreting the results  
  - Writing the LCA report according to ISO Standards |

## Qualification system

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

Basic:


Complementary:


Others resources:

Hyperlink

SimaPro Demo

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