# Course guide

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

<table>
<thead>
<tr>
<th>Unit in charge:</th>
<th>Barcelona School of Agri-Food and Biosystems Engineering</th>
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<tbody>
<tr>
<td>Teaching unit:</td>
<td>751 - DECA - Department of Civil and Environmental Engineering</td>
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</table>

**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).

<table>
<thead>
<tr>
<th>Academic year:</th>
<th>2022</th>
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<tbody>
<tr>
<td>ECTS Credits:</td>
<td>6.0</td>
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<tr>
<td>Languages:</td>
<td>English</td>
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## LECTURER

Coordinating lecturer: Asunción Antón Vallejo

### 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 focused 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>
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<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>60,0</td>
<td>40.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
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Total learning time: 150 h
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

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

Related activities:
- Coursework: inventory
- Initial coursework presentation

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

Full-or-part-time: 27h
Theory classes: 17h
Laboratory classes: 10h
2. Single issue indicators

Description:
- Carbon footprint
- Water footprint

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 activities:
- Invited speaker presentation

Related competencies:
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
CG-SCS. SUSTAINABILITY AND SOCIAL COMMITMENT

Full-or-part-time: 3h
Theory classes: 3h

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:
- 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

Related activities:
- Coursework: LCA project
- Final coursework presentation

Related competencies:
CG-SCS. SUSTAINABILITY AND SOCIAL COMMITMENT
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
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.

Full-or-part-time: 24h
Theory classes: 14h
Laboratory classes: 10h
4. Social and economic life cycle assessment

Description:
- Social Life Cycle
- Life Cycle Costing

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-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
CG-SCS. SUSTAINABILITY AND SOCIAL COMMITMENT

Full-or-part-time: 3h
Theory classes: 3h

5. Ecodesign and Ecolabel

Description:
- Ecodesign
- Ecolabel

Related competencies:
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
CG-SCS. SUSTAINABILITY AND SOCIAL COMMITMENT

Full-or-part-time: 3h
Theory classes: 3h

ACTIVITIES

Initial oral presentation

Description:
Oral presentation of the coursework first stage (inventory) in groups of 2-4 people.

Specific objectives:
- To carry out a LCA project by:
  o Compiling an inventory of relevant energy and material inputs and environmental releases

Delivery:
- Coursework: inventory

Related competencies:
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
CE-BC-17. Decision taking by assessment of available resources in multidisciplinary work-teams.

Full-or-part-time: 3h
Theory classes: 3h
Final oral presentation

Description:
Oral presentation of the coursework (LCA project) in groups of 2-4 people.

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

Delivery:
- Coursework: LCA project

Related competencies:
CG-SCS: SUSTAINABILITY AND SOCIAL COMMITMENT
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
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.

Full-or-part-time: 3h
Theory classes: 3h

GRADING SYSTEM

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

BIBLIOGRAPHY

Basic:

Complementary:
- “Greenhouse gases Carbon footprint of

RESOURCES

Hyperlink: