

## Sustainability in Food Systems (I690009)

**Course size** *(nominal values; actual values may depend on programme)*

**Credits 5.0**

**Study time 150 h**

**Course offerings and teaching methods in academic year 2024-2025**

A (semester 1)

English

Kortrijk

lecture

seminar

group work

**Lecturers in academic year 2024-2025**

Huysveld, Sophie

LA24

lecturer-in-charge

Cadena Martinez, Erasmo

LA24

co-lecturer

Dewulf, Jo

LA24

co-lecturer

**Offered in the following programmes in 2024-2025**

[Master of Science in Sustainable Food Packaging](#)

**crdts**

5

**offering**

A

**Teaching languages**

English

**Keywords**

sustainability, sustainable production and consumption, circular economy (metrics), material flow analysis, life cycle thinking, life cycle sustainability assessment

**Position of the course**

This course focuses on the sustainability (assessment) of technological operations (human activities) and how to make them more sustainable from an environmental perspective. Also economic and social aspects are considered. Special attention is paid to food and food packaging systems, and on how the choice of production technology, ingredients, efficiency, logistics and avoidance of food waste contribute to a sustainable food system. The lectures are divided into two main parts, i. theory and concepts, and ii. assessment methods. On the one hand, relevant concepts and assessment methods are covered in a theoretical way. On the other hand, students learn how to use the life cycle assessment method, and more specifically how to conduct it for applications in the food and packaging industry.

**Contents**

- Introduction on sustainable development, sustainability challenges, sustainable production and consumption
- Technology and sustainability
- The natural environment: resource base and sink for emissions
- Metabolism of anthroposphere (incl. circular economy)
- Life cycle thinking and prospective assessment
- Material Flow Analysis, circular economy metrics, etc.
- Life Cycle Assessment (LCA), social LCA, Life Cycle Costing, Techno-economic assessment, etc.

**Initial competences**

Students are expected to have a scientific background at a university level (physics, chemistry, life sciences) and basic engineering skills (such as unit conversions, mass and energy balances).

**Final competences**

- 1 Have knowledge of the current environmental, social and economic sustainability challenges.
- 2 Have an understanding of systems thinking and to illustrate its importance for food systems

with concrete examples.

- 3 Explain the concept 'sustainable development' and place it in the context of the different stakeholders of food systems.
- 4 Explain how resource consumption and emissions from technological operations affect environmental sustainability of food systems.
- 5 Explain the concepts of clean technology, industrial ecology, circular economy and life cycle thinking.
- 6 Apply life cycle thinking when analyzing the sustainability of technological operations in food systems.
- 7 Explain the challenges of prospective sustainability assessment of technological operations.
- 8 Distinguish environmental, economic and social effects of technological operations in food systems.
- 9 Apply Material Flow Analysis for food systems and grasp metrics to assess circularity.
- 10 Conduct a basic life cycle assessment study to quantify or compare the environmental sustainability of food and packaging systems using specialised software and critically discuss the study's limitations and results.
- 11 Explain methods to assess environmental, economic and social effects of technological operations.
- 12 Critically interpret the results from methods used to assess the sustainability of technological operations.

#### **Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

#### **Conditions for exam contract**

This course unit cannot be taken via an exam contract

#### **Teaching methods**

Group work, Seminar, Lecture

#### **Extra information on the teaching methods**

Lectures (can be online) Theory and guest speaker from industry.

Seminar: coached exercises. Exercise session to solve exercises on material flow analysis.

Seminar: practical PC room classes. Two coached PC sessions on Life Cycle Assessment.

This is to prepare for the LCA assignment.

Group work: This assignment is to perform an LCA (compare 2 packaging alternatives or evaluate the eco-design of a food packaging system) with the aid of software. Intermediate feedback moment with lecturers for the LCA assignment.

#### **Study material**

None

#### **References**

Background material will be made available through the student platform (Ufora).

#### **Course content-related study coaching**

Before and after the lectures and exercises, the student can ask additional information or explanations to the teacher or assistant. The teacher and assistant can also be contacted by mail.

#### **Assessment moments**

end-of-term and continuous assessment

#### **Examination methods in case of periodic assessment during the first examination period**

Written assessment with open-ended questions

#### **Examination methods in case of periodic assessment during the second examination period**

Written assessment with open-ended questions

#### **Examination methods in case of permanent assessment**

Participation, Assignment

#### **Possibilities of retake in case of permanent assessment**

examination during the second examination period is possible in modified form

#### **Extra information on the examination methods**

##### ***Periodic evaluation:***

- written exam
- study material: theory lectures + guest lecture(s) + exercise session

**Non-periodic evaluation:**

- Participation at exercise session, two coached PC sessions and guest lecture(s)
- Report and presentation of LCA assignment
- Participation at LCA assignment presentations of other students

**Calculation of the examination mark**

**Periodic evaluation (written exam):** 65% or 13/20

**Non-periodic evaluation (assignment, and participation at exercise session, participation at 2 coached PC sessions, participation at guest lecture(s) and participation at the task presentations):** 35% or 7/20

Students who eschew one or more parts of the evaluation may be failed by the examiner. Final scores of 10/20 and above may be reduced to the highest failing mark (9/20).

Peer assessment will be performed for the groupwork, hence the final mark per student belonging to the same group may differ. The deadlines for the assignment must be respected. If not, the final mark may be reduced. If the student obtains a total mark lower than 10/20, the mark obtained for the non-periodic evaluation during the first examination period can be transferred to the second examination period only if the student did not fail, i.e. he/she did not have a mark lower than 3.5/7.