

## 69758 - Industrial ecology and management

### Syllabus Information

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**Academic year:** 2023/24

**Subject:** 69758 - Industrial ecology and management

**Faculty / School:** 100 - Facultad de Ciencias

**Degree:** 627 - Master's Degree in Circular Economy

**ECTS:** 6.0

**Year:** 01

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

The *Industrial Ecology and Logistics* subject is designed to understand the principles of industrial ecology and the main principles of logistics applied to it. The *Industrial Ecology and Logistics* subject is designed for students who have studied a science or engineering degree and is taught at the University of Zaragoza.

This subject is aligned with Sustainable Development Goals (SDGs) numbers 9 (Industry, Innovation and Infrastructure) and 12 (Responsible Production and Consumption) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of its learning results provides training and competence to contribute to some extent to their achievement.

### 2. Learning results

- To be able to apply the basic principles of ecology and industrial symbiosis.
- To learn about the most revealing examples of industrial symbiosis and industrial eco-parks.
- To be able to apply the most common analysis tools related to industrial symbiosis.
- To be able to apply the essential concepts related to logistics and sustainable supply chain.
- To understand the potential benefits of sustainable logistics and supply chain management in a global context.
- To be able to solve logistics and supply chain management problems.

### 3. Syllabus

Topic 1. Basic principles of industrial ecology and industrial systems.

Topic 2. Relevant industrial eco-parks.

Topic 3. Material flow analysis and Sankey diagrams.

Topic 4. *Input-output* analysis.

Topic 5. Implementation of industrial ecology: industrial ecosystems, eco-industrial parks.

Topic 6. Analysis of costs associated with industrial symbiosis.

Topic 7. Logistics and supply chain management. Green logistics.

Topic 8. Reverse logistics and recycling.

Topic 9. Transportation of goods.

Topic 10. Sustainable transport procurement, distribution and storage.

Topic 11. Efficient route and location selection methods.

### 4. Academic activities

**Master classes:** 16 hours

Sessions of 50 minutes each for the entire group. Teachers explain the theoretical contents and solve representative applied problems. Teaching materials are available in Moodle.

**Problem solving and case studies:** 44 hours of student work, including 8 face-to-face hours.

Students must prepare two reports.

**Study:** 84 hours

Students must study theory, read supplementary readings and prepare for the final test.

**Assessment tests: 6 hours.**

Students take a final short answer, long answer and/or open-ended questions test.

## 5. Assessment system

The subject is assessed using two evaluation methods: continuous and global. For this purpose, the grades obtained in the following tests will be used:

- Two reports (rated I1 and I2). Each report consists of a report on a topic related to the subject or the critical analysis of a research or popularisation article. The structure and format of the required reports is communicated to the students through Moodle. The reports are sent to the teacher electronically.
- Final short answer, long answer and/or open-ended question test (graded F). The test is held simultaneously in each university under conditions that guarantee the proper identification of students and the impossibility of fraud.

The grades obtained by each student in the above assessment activities are weighted according to the following formulas:

Formula 1:

Final grade:  $0.25 \times I1 + 0.25 \times I2 + 0.5 \times F$

Formula 2:

Final grade: F

For the application of formula 1 it is necessary to obtain at least a 4 in each of the tests. The final grade is the best grade obtained in each case after the application of formula 1 and formula 2.