Universidad Zaragoza

Academic Year/course: 2021/22

69758 - Industrial ecology and management

Syllabus Information

Academic Year: 2021/22
Subject: 69758 - Industrial ecology and management
Faculty / School: 100 - Facultad de Ciencias
Degree: 627 -
ECTS: 6.0
Year: 01
Semester: Second semester
Subject Type: Optional
Module:

1. General information

1.1. Aims of the course

The Industrial Ecology and Logistics course is designed to understand the principles of Industrial Ecology and the main principles of logistics applied to it. These approaches and objectives are aligned with the Sustainable Development Goals (SDG) number 9 (Industry, innovation and infrastructure) and 12 (Responsible production and consumption) of the United Nations 2030 Agenda (https://www.un.org/sustainabledevelopment/es/), in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to a certain extent to its achievement.

1.2. Context and importance of this course in the degree

The Industrial and Logistics Ecology course is taught in the second semester as an optional course in the scientific-technical module. It is designed for students from Science or Engineering degrees. The subject is taught from the University of Zaragoza.

1.3. Recommendations to take this course

Regular use of the teaching platform and daily study of the concepts presented are recommended, with special emphasis on solving practical activities. Likewise, it is vital to consult the doubts and questions that pose difficulties in the teaching and learning process, for which personalised tutorials should be used.

2. Learning goals

2.1. Competences

BASIC COMPETENCES

CB6 - Have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with the first cycle, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context.

CB7 - Can apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.

CB8 - Have the ability to integrate knowledge and handle complexity, and formulate judgements with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgements.

CB9 - Can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and nonspecialist audiences clearly and unambiguously.

CB10 - Have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous.

GENERAL COMPETENCES

CG1 - Obtain information in Spanish and English using information technologies efficiently

CG2 - Manage, critically analyse and synthesise information

CG3 - Critically reflect in a systemic way and using causal relationships

CG4 - Formulate, analyse, evaluate and compare in a multidisciplinary way new or alternative solutions for different problems

CG5 - Work in interdisciplinary groups

CG6 - Transmit information efficiently through information and communication technologies

CG7 - Develop management skills (decision making, goal setting, problem definition, design, and evaluation)

CG8 - Properly manage available resources on time

2.2. Learning goals

The student, passing this subject, achieves the following results:

1. Be able to apply the basic principles of ecology and industrial symbiosis.
2. Know the most revealing examples of industrial symbiosis and industrial eco-parks.
3. Be able to apply the most common analysis tools related to industrial symbiosis.
4. Being able to apply the essential concepts related to logistics and the sustainable supply chain.
5. Know the potential advantages of a sustainable supply chain and logistics management in a global context.
6. Being able to solve logistics and supply chain management problems available.

2.3. Importance of learning goals

Obtaining the learning results is essential to understand the principles of Industrial Ecology and the main principles of logistics applied to it.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The course will be evaluated using two assesment methods (continuous and global), so that the student will be assigned the grade that is most beneficial to him. For this, the grades obtained in the following tests will be used:

* Two reports (rated I1 and I2). Each report will consist of a memory on a topic related to the subject or the critical analysis of a research or popular article. The structure and format of the required reports will be communicated to students through moodle. The reports will be sent to the teacher electronically.

* Final short, long and / or development answer test (scored as F). The test will be held simultaneously at each university under conditions that guarantee the proper identification of students and the impossibility of fraud in them.

The grades obtained by each student in the aforementioned evaluation activities will be weighted according to the following formulas:

Formula 1:

Final mark of the course: $0.25 \times I1 + 0.25 \times I2 + 0.5 \times F$

Formula 2:

Final grade for the course: F

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

The number of official exam sessions to which enrollment entitles (2 per enrollment) as well as the consumption of these calls will be adjusted to the Rules of Permanence in Master's Studies and the Rules of Learning Assessment of the University of Zaragoza (https://ciencias.unizar.es/normativas-asuntos-academicos). To this last regulation, the general criteria for the design of the tests and the grading system will also be adjusted, and according to the same, the time, place and date on which the review will be held when publishing the qualifications will be made public.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

Learning in this subject is based on the combination of expository method and flipped classroom.

According to the expository method, the professor develops the presentation of the topics before the students present in the

same classroom or other universities through videoconference. In addition, other teaching materials will be included in the Moodle platform that will allow dedicating some of the classes to interact with students, posing questions that allow relating concepts.

To solve exercises and problems, students will be assigned exercises and problems that they must solve individually.

The preparation of theoretical works consists of writing reports on a topic assigned by the teacher following his instructions and with her tutoring.

Problem-Based Learning is an instructional and learning-oriented educational approach in which students tackle real problems in small groups and under the supervision of a tutor.

Cooperative learning in small groups

The workshop consists of a supervised session where students work individually or in groups and receive assistance and guidance when necessary from the teaching staff.

In case of studies, students carry out case studies or solve practical assumptions, in such a way that the student is required to elaborate an argued solution regarding a question, solve a series of specific questions or carry out a global reflection. The solutions to the problems or assumptions or the critical analysis of the case are evaluated. It involves the presentation of work and the teacher's feedback on them.

The virtual work in the network consists of a Methodology based on collaborative work that starts from a virtual space (Teaching Digital Ring, specifically Moodle platform), designed by the teacher and with restricted access, in which documents can be shared to work on them simultaneously and add new ones, collect virtual lectures and lectures, both theoretical and practical, communicate synchronously and asynchronously, and participate in all the debates that each member may constitute.

All these training activities will be supported by tutorials from teachers via videoconference.

4.2. Learning tasks

Master class: 12 hours

Problem and case solving: 4 hours

Teaching work: 66 hours

Assessment tests: 2 hours

Study: 66 hours

4.3. Syllabus

1. Basic principles of industrial ecology and industrial systems.
2. Principles of industrial metabolism.
3. Technosphere-biosphere analogy.
4. Analysis tools in industrial ecology: material flow analysis, life cycle analysis (products, processes, and infrastructures).
5. Implementation of industrial ecology: industrial ecosystems, eco-industrial parks.
6. Minimisation, treatment, and disposal of waste.
7. Logistics and supply chain management.
8. Reverse logistics and recycling.
9. Freight transportation.
10. Sustainable storage.
11. Sustainable shopping.

4.4. Course planning and calendar

Information on schedules, calendar, and exams is published on the Master's page on the website of the Faculty of Sciences of the University of Zaragoza (https://ciencias.unizar.es/master-en-economia-circular). The presentation of reports will be carried out according to the calendar that will be announced in due course through the Moodle page of the course.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=69758&Identificador=C74188