UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Chemical Fundamentals of Sustainability

2122-2-F5401Q070

Aims

The main objective is to provide the student with the theoretical and practical knowledge useful for evaluating the interaction between production activities and the environment from a sustainability perspective and the tools to operate in the field of innovation.

Knowledge and understanding

At the end of the course the student knows:

- The foundations of sustainable development;

- The physico-chemical processes related to the transport of matter;

- The fundamentals of life cycle analysis.

Applying knowledge and understanding

At the end of the course the student is able to:

- Calculate the distribution of chemical compounds in different environmental compartments.

- Calculate mass and energy flows in the life cycle analysis of a product or process.

Making judgements

At the end of the course the student is able to:

- Analyze the phases of the life of a product or a process;

- Critically evaluate the results obtained from the application of the models;

- Identify possible interventions to reduce the impacts.

Learning skills

Being able to apply the acquired knowledge to contexts different from those presented during the course, and to understand the topics covered in the scientific literature concerning the sustainability issue.

Contents

Sustainability, circular economy, life cycle thinking. Models for the interaction and distribution of chemical compounds in the environment. Technologies for recycling and recovery. Monitoring and analysis tools for sustainable management of human activities: life cycle analysis, environmental sustainability indicators (global warming potential, ecological footprint, carbon and water footprint).

Detailed program

The need to move from growth based on "unlimited resources" to "sustainable development", which meets the needs of the present, without compromising the ability of future generations to meet their own needs, is now widely recognized. The European Union considers sustainable production and consumption as a crucial and priority challenge of this century.

The goal is to improve the environmental performance of products and to increase the demand for products and technologies with a reduced environmental impact by creating synergies between the various policy instruments through an integrated approach between eco-design, product labeling, incentives, public procurement and new consumption models.

Exercises: multimedia models, life cycle assessment, global warming potential, ecological footprint, water and carbon footprint. Case Studies.

Prerequisites

Fundamentals of Chemistry and Physics.

Teaching form

The course includes 2 CFU of lecture classes (16 hours) to provide the student with basic knowledge of the fundamental principles enriched by 4 CFU of exercise sessions (32 hours) to learn how to use the most used applications in this area.

Textbook and teaching resource

Teaching material will be available on the e-learning platform.

Semester

first semester

Assessment method

Oral examination

The oral examination exam aim is to verify the knowledge of the topics covered in the lectures and exercises. In the oral exam, as far as possible, the student will be assessed on the basis of the following criteria: (1) knowledge and understanding; (2) ability to connect different concepts; (3) autonomy of analysis and judgment; (4) ability to use the scientific language correctly.

Exam grade in the range 18-30/30.

It is possible to take the exam in English.

Office hours

By appointment to be made by e-mail (marina.lasagni@unimib.it, elena.collina@unimib.it).