UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Lca and Sustainability Indicators

2526-1-F7503Q031-F7503Q03102

Aims

The teaching of the second module of 6 CFU is aimed at providing the student with the theoretical-practical knowledge useful for evaluating the interaction between production activities and the environment in a sustainability perspective and the tools for operating in the field of innovation.

The topics of this module are closely related to some aspects of the first module, and teaching will, as necessary and beneficial for genral understanding of interconnectivities of taught aspects, see incorporation of parts of the first module.

The students are invited to consult the syllabus of the entire course for details regarding learning- and skill-related objectives, etc.

Contents

• The reactivity of chemical compounds in the environment.
• Regulatory aspects like REACH, concerned with sustainability and control of chemical production and exploitation and use of single chemicals and mixtures.
• Indicators of sustainability, tools for quantifying sustainability.
• Life cycle analysis as environmental sustainability indicator.

Detailed program

• Reactivity of compounds in the atmosphere and consequences for environment, health and cultural heritage.
• Reactivity of compounds in water, including surface waters and oceans.

• Life time and half life of the compounds in the environment.
• Regulatory tools, especially REACH, for implementing sustainability and environmental compatibility in socio-economic contexts and legislation.
• Sustainability indicators: Human development index, Index of Sustainable Economic Welfare.
• Environmental sustainability indicators: emergetic analysis, ecological footprint.
• Life cycle analysis: history, objectives,
• Phases of an LCA analysis: goal and scope definition, inventory (primary, secondary and tertiary data, allocation), impact assessment (midpoint and endpoint impact categories, classification, characterization, normalization, weighing), interpretation.

Prerequisites

• Basic knowledge of organic and inorganic chemistry.
• Basic notions of thermodynamics.

Teaching form

• 8 two-hour lectures, in person, with delivered didactics, (2 credits) by presenting slides.
• 10 four-hour practical classes of interactive teaching in presence (4 CFU) on the most used calculation methods and software in the field of LCA analysis.

Textbook and teaching resource

• B. Marchesini, M. Monari *Il regolamento REACH* Maggioli Editore
• Michael Z. Hauschild, Ralph K. Rosenbaum, Stig Irving Olsen *Life Cycle Assessment Theory and Practice* Springer
• slides
• notes shown during lectures and additional material on selected topics, i.e., scientific articles, made available on the e-learning website of the course.

Semester

I semester (November/December - January)

Assessment method

The final exam consists of a single oral exam at the end of the course, with a score between 18-30 / 30 *cum laude*, which comprises the discussion of various topics covered in the course, with an emphasis also on the connections between concepts and processes, such as to arrive at a critical evaluation of work from the point of view of sustainability in chemistry as a whole.

Assesment will be based on the following criteria: (1) knowledge and understanding; (2) ability to connect different concepts; (3) autonomy of analysis and judgment; (4) ability to correctly use scientific language.

Given the experimental nature of the hands-on experience using different LCA tools, the concerned module offers a final test that can be validated in the final exam for the part of course concerned with the LCA. N.B.: This written test remains valid for the entire academic year in which the course was carried out. In the event that the student does not take the written exam in progress or opts to take the exam in another academic year, the LCA analysis part is again part of the oral exam program.

Office hours

Always, after scheduling an appointment *via* phone or e-mail.

Sustainable Development Goals

QUALITY EDUCATION | INDUSTRY, INNOVATION AND INFRASTRUCTURE | SUSTAINABLE CITIES AND COMMUNITIES | RESPONSIBLE CONSUMPTION AND PRODUCTION