UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Chemical Process and Technology

2425-1-F5401Q069

Learning area

The course is part of the learning area of applied chemical disciplines and process engineering, with the aim of providing students with the skills needed to understand and critically evaluate the design and operational choices adopted in industrial chemical processes, in light of the technical, economic, environmental and safety variables that influence their efficiency and sustainability.

Learning objectives

Provide advanced tools for understanding the technologies and plant choices used in the chemical industry, sizing and evaluating the solutions identified from an energy and environmental impact point of view. Propose a path, through the subjects dealt with, which shows the interdisciplinarity of the choices that graduates in Chemical Sciences and Technologies must face every day in the exercise of their duties. Provide students with the tools for a broader view of chemistry and its use, also aimed at consolidating a continuous training choice.
Further consolidate the relationship between universities and industry, structurally complementary for intellectual and industrial development.

Contents

Energy and chemical industry

Production of building blocks from renewable sources

Reactoristics

Advanced matter transport phenomena

Detailed program

- Evolution of the energy aspect in the chemical industry; trends in green chemistry, decarbonisation, energy efficiency, CO2 capture and greenhouse gases.
- Chemical technologies: absorption and stripping, reactor engineering (piston and mixing reactors, isothermal and non-isothermal), catalysis, hydrolysis (membranes). Contextualization in corporate areas of concepts such as sustainability, LCA and other benchmarks (waste to fuel, carbon footprint);
- energy production and advanced fuels
- traditional chemical processes (hydrogen synthesis, ammonia, methanol, ethylene)
- chemical processes starting from renewable raw materials
- biocompatible polymers and monomer production from renewable sources

Prerequisites

Physical-chemistry principles: fundamentals of thermodynamics of chemical equilibria, transport phenomena, organic and inorganic chemistry, catalysis and chemical kinetics.

Teaching methods

Theoretical lectures with explanations on the blackboard and use of slides, in-depth studies with complementary notions during the exercises activities

Assessment methods

Written and oral exam.

The written test, if any, includes a short section (max 20') which serves as an admission test for the subsequent oral phase.

Required skills: ability to rework the concepts acquired in the classroom both from a multidisciplinary perspective and in the field of problem solving; resolution of short qualitative and quantitative questions in the industrial field. Clear exposition of the notions learned during the course.

Textbooks and Reading Materials

Jacobs A. Moulijn,Michiel Makkee,Annelies Van Diepen

Chemical Process Technology

Ed Wiley

Carlo Giavarini

Guida allo studio dei processi di raffinazione e petrolchimica

Ed Efesto

Forni Rossetti

fenomeni di trasporto

Ed Cortina Milano

Gian Berto Guarise

Lezioni di impianti chimici

Ed Cleup

Natoli Calatozzolo

Tecnologie chimiche industriali

Ed Edisco

F.Di Benedetto

Oil and Bio trading

Ed FrancoAngeli

Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE