

Course Unit	Process Analysis	Field of study	Chemical Process Engineering
Bachelor in	Chemical Engineering	School	School of Technology and Management
Academic Year	2023/2024	Year of study	2
Type	Semestral	Semester	2
Workload (hours)	162	Contact hours	T 30 TP - PL 30 TC - S - E - OT - O -
Level	1-2	ECTS credits	6.0
Code	9125-755-2201-00-23		

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) José António Correia Silva

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Understand the Chemical Engineering profession
2. Analyse unit operations and design processes
3. Learn how to explore alternatives in the design of processes with impact in the following factors: maximization of products; minimization of sub-products, energy consumption e cost optimization
4. Perform mass and energy balances in steady state in processes and unit operations
5. Use graphical analysis concepts to analyse separation processes

Prerequisites

Before the course unit the learner is expected to be able to:
None

Course contents

Design of processes- unit operations and flux diagrams. Mass and energy balances. Graphical analysis of processes. Transient processes.

Course contents (extended version)

1. Structure of chemical industry
2. Process design - unit operations and flowdiagrams
3. Models derived from laws and mathematical analysis
 - The principle of conservation of mass
 - The principle of conservation of energy
4. Graphical analysis
 - Phase diagrams (PT, PV, VT)
 - Graphical representation of experimental data phase equilibrium
 - Graphical analysis of absorption separation processes
 - Graphical analysis of flash drums
 - Graphical analysis of liquid-liquid extraction processes
 - Graphical analysis of distillation columns (McCabe-Thiele graphical procedure)
5. Transient processes
 - Surge tank
 - Batch reactors
 - CSTR reactors

Recommended reading

1. T. Michael Duncan and Jeffrey A. Reimer; Chemical Engineering Design and Analysis, Cambridge University Press, 1st Edition, 1998.
2. Richard M. Felder, Ronald W. Rousseau; Elementary Principles of Chemical Processes, John Wiley & Sons, 3rd Edition, 2000.

Teaching and learning methods

Theory: Description of theoretical concepts. Practice: Discussion of course materials and homework assignments.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
 - Intermediate Written Test - 30% (Week 5)
 - Intermediate Written Test - 30% (Week 10)
 - Intermediate Written Test - 40% (Week 15)
2. Alternative 2 - (Regular, Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 100%

Language of instruction

English

Electronic validation

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12-02-2024	13-03-2024	13-03-2024	16-03-2024