

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

José António Correia Silva	Hélder Teixeira Gomes	António Manuel Esteves Ribeiro	José Carlos Rufino Amaro
12-02-2024	13-03-2024	13-03-2024	16-03-2024