

Course Unit	Process Analysis			Field of study	Chemical Process Engineering	
Bachelor in	Chemical Engineering			School	School of Technology and Management	
Academic Year	2022/2023	Year of study	2	Level	1-2	ECTS credits 6.0
Туре	Semestral	Semester	2	Code	9125-755-2201-00-22	
Workload (hours)	162	Contact hours	T 30 TP T - Lectures; TP - Lectures a	- PL 30 T nd problem-solving; PL - Problem-	C - S - solving, project or laboratory; TC -	E · OT · O · 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

- Analyse unit operations and design processes
   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
   Perform mass and energy balances in steady state in processes and unit operations
   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
- Structure of crientical industry
   Process design unit operations and flowdiagrams
   Models derived from laws and mathematical analysis

- Models derived from laws and mathematical analysis

   The principle of conservation of mass
   The principle of conservation of energy

   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 distillation columns (McCabe-Thiele graphical procedure)

   Transient processes
- 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

- Alternative 1 (Regular, Student Worker) (Final)

   Intermediate Written Test 30% (Week 5)
   Intermediate Written Test 30% (Week 10)
   Intermediate Written Test 40% (Week 15)

   Alternative 2 (Regular, Student Worker) (Final, Supplementary, Special)

   Final Written Exam 100%

## Language of instruction

English

Electronic validation			
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16-02-2023	21-03-2023	21-03-2023	25-03-2023