

Course Unit	Separation Processes		Field of study	Chemical Process Engineering	
Bachelor in	Chemical Engineering		School	School of Technology and Management	
Academic Year	2023/2024	Year of study	3	Level	1-3
Type	Semestral	Semester	2	ECTS credits	6.0
		Code			
		9125-755-3202-00-23			
Workload (hours)	162	Contact hours	T	30	TP
			PL	30	TC
			S	-	E
			OT	-	O

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. Apply the principles of phase equilibrium and mass and energy balances in single separation units
2. Understand the concept of cascade separation
3. Analyze and design separation processes by liquid-liquid extraction
4. Be able to analyze and design separation processes by distillation
5. Analyze and design separation processes by absorption and stripping

Prerequisites

Before the course unit the learner is expected to be able to:

Dominate basic concepts of thermodynamics, heat and mass transfer

Course contents

Single equilibrium stages and flash calculations. Cascades. Liquid-liquid extraction. Distillation of binary mixtures. Absorption and stripping

Course contents (extended version)

1. Single equilibrium stages and flash calculation
2. Separation cascades
 - Cocurrent, crosscurrent and countercurrent Cascade
3. Liquid-liquid extraction
 - Equipment
 - General design considerations
 - Hunter-Nash graphical equilibrium-stage method
 - Maloney-Schubert graphical equilibrium-stage method
4. Distillation of binary mixtures
 - Equipment
 - General design considerations
 - McCabe-Thiele graphical equilibrium method
 - Ponchon-Savarit graphical equilibrium-stage
5. Absorption and stripping
 - Equipment
 - General design considerations
 - Graphical equilibrium-stage methods

Recommended reading

1. J. D. Seader, Ernest J. Henley, Separation Process Principles, John Wiley & Sons, 2nd Edition, 2006.
2. Christie John Geankoplis, Transport Processes and Separation Process Principles, Prentice-Hall, 4th Edition, 2003.

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