SUBJECT TEACHING GUIDE

G787 - Advanced Separation Processes

Degree in Chemical Engineering
First Degree in Chemical Engineering

Academic year 2024-2025

1. IDENTIFYING DATA				
Degree	Degree in Chemical Engineering First Degree in Chemical Engineering		Type and Year	Optional. Year 4 Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications			
Discipline	Subject Area: Option A: Fundamental Chemical Engineering Subject Area: Option D: European Project Semester Optional Module			
Course unit title and code	G787 - Advanced Separation Processes			
Number of ECTS credits allocated	6	Term	Semester based (2)	
Web				
Language of instruction	English		Mode of delivery	Face-to-face

Department	DPTO. INGENIERIAS QUIMICA Y BIOMOLECULAR
Name of lecturer	EUGENIO BRINGAS ELIZALDE
E-mail	eugenio.bringas@unican.es
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO EUGENIO BRINGAS ELIZALDE (S2013)
Other lecturers	INMACULADA ORTIZ URIBE PEDRO MANUEL GOMEZ RODRIGUEZ MARTA RUMAYOR VILLAMIL GABRIEL ZARCA LAGO

3.1 LEARNING OUTCOMES

- Be able to know the fundamentals and applications of rate-controlled separation processes:
  - Membrane-based separation processes
  - Solid-fluid separation processes

4. OBJECTIVES

Objetivos
Be able to know and understand from a qualitative and quantitative point of view the phenomena taking place in membrane units and adsorption/ion exchange columns.
Be able to identify and compare advanced separation processes on their application in solving separation problems in the context of industry and environment.

6. SUBJECT PROGRAM

CONTENTS	
1	1. UNIT 1: Introduction to advanced separation processes 1.1. Introduction 1.2. Definition and classification of advanced separation processes
2	UNIT 2: Case studies of environmental and industrial applications 2.1. Energy sector: CO2 capture from flue gases 2.2. Water treatment: Tertiary wastewater treatment 2.3. Food industry: Dairy products processing 2.4. Pharmaceutical industry: Purification of active ingredients and solvent recovery
3	3. UNIT 3. Fluid-solid separation processes 3.1. Adsorption. Fundamentals, design and applications. 3.2. Ion Exchange. Fundamentals, design and applications.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Partial Exams	Written exam	No	Yes	30,00
Portfolio	Others	No	No	20,00
Presentation Practical Sessions	Oral Exam	No	Yes	50,00
TOTAL				100,00

Observations

The continuous assessment procedure is based on the performance of Test 1 (15%) and Test 2 (15%) to evaluate the theoretical contents, and a power point presentation to evaluate the results derived from the practical sessions (50%). Also, several tasks and small projects will be proposed during the semester as part of the portfolio which represent 20% of the final grade.
The student who do not follow the continuous evaluation procedure will have the option of performing a final exam in the date scheduled by the ETSIIyT (minimum mark 5.0).

Observations for part-time students

Article 24 from Reglamento de los Procesos de Evaluación en la Universidad de Cantabria will be applied

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

- WANKAT, P.C., Rate-Controlled Separations, 2005, Springer
- SEADER, J.D., HENLEY, E.J. Separation Process Principles. 2006. 2nd Wiley & Sons.
- CUSSLER, E.L., Diffusion. Mass Transfer in Fluid Systems. 2009. 3rd Ed. Cambridge University Press.
- DRIOLI, E., CRISCUOLI, A., CURCIO, E., Membrane Contactors: Fundamentals, Applications and Potentialities. 2006. Elsevier.
- COULSON, J.M. RICHARDSON, J.F. Chemical Engineering (Particle Technology and Separation Processes). 2002. Oxford; Butterworth Heinemann, 2002