SUBJECT TEACHING GUIDE

1038 - Chemical Processes

Master's Degree in Industrial Engineering
Master's Degree in Industrial Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Master's Degree in Industrial Engineering Master's Degree in Industrial Engineering			Type and Year	Compulsory. Year 1 Compulsory. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Chemical Processes Industrial Technology Industrial Technologies				
Course unit title and code	1038 - Chemical Processes				
Number of ECTS credits allocated	5	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIAS QUIMICA Y BIOMOLECULAR
Name of lecturer	ALFREDO ORTIZ SAINZ DE AJA
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Other lecturers	MARCOS FALLANZA TORICES LUCIA GOMEZ COMA

3.1 LEARNING OUTCOMES

- Identify parts of the flowsheet in Chemical Processes
  Formulate and solve mass, energy and momentum balances at the reaction and separation steps in a chemical process
  Simulate the behavior (results from the balances) in chemical processes

4. OBJECTIVES

Knowing the fundamentals, design and applications of heterogeneous chemical reactors.
Knowing the fundamentals, design and process applications in fluid-solid separation.
Apply simulation tools and integration of chemical processes in 2 case of study of industrial processes

6. SUBJECT PROGRAM

CONTENTS	
1	1. Introduction to Chemical Processes: Process Variables, Diagrams, and Chemical Kinetics
2	2. Fundamentals, Design, and Applications of Homogeneous Chemical Reactors 2.1. Solving Mass, Energy, and Momentum Balances in Ideal Homogeneous Reactors
3	3. Fundamentals, design and applications of heterogeneous chemical reactors. 3.1 . Resolution of the mass, energy and momentum balances in fixed bed reactors. 3.2. Design of fluidized bed reactors 3.3. Case of study: Modeling and simulation of a fixed bed reactor for the catalytic oxidation of ethylene
4	4. Fundamentals, design and process applications in fluid-solid separation. 4.1. Adsorption 4.2. Ion exchange 4. 3. Cases of study: -Modeling and simulation of styrene by dehydration of activated alumina. -Modeling and simulation of a water softening process by ion exchange.
5	5. Simulation and integration of chemical processes.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Objective Test 1 Minimum grade to overcome this part of the subject: 5 It will take place between weeks 8-10	Written exam	No	Yes	45,00
Objective Test 2 The date of realization coincides with the final exam	Written exam	No	Yes	45,00
Case Study: Process Simulation	Work	No	No	10,00
TOTAL				100,00

Observations

Continuous evaluation requires the completion of objective tests 1 and 2.
In case of not passing the subject in the ordinary call for January, an objective test of all the contents of the course will be carried out in the extraordinary call.

In the case of a health alert that makes it impossible to conduct the evaluation in person, the same type and distribution of tests will be maintained with the support of telematic means.

Observations for part-time students

Part-time students will be able to adapt the assessment to their dedication regime, the results being preserved for at least two consecutive academic years

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

R. M. Murphy, Introducción a los procesos químicos. Principios, análisis y síntesis, 2007, McGraw Hill
O. Levenspiel, Chemical Reaction Engineering, third edition, 1999, John Wiley and Sons
Fogler, H. S. (2016). Elements of chemical reaction engineering (5th ed.). Upper Saddle River, NJ: Pearson Education.
Coulson & Richardson, Chemical Engineering, 1993, Pergamon Press
McCabe, W., Smith, J. and Harriott, P. , Chemical engineering unit operations , McGraw Hill , 2004 , Seventh Edition