

## SUBJECT TEACHING GUIDE

### G790 - Particle Science and Technology

#### 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 Optional Module				
Course unit title and code	G790 - Particle Science and Technology				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. DE QUIMICA E INGENIERIA DE PROCESOS Y RECURSOS.				
Name of lecturer	JOSEFA FERNANDEZ FERRERAS				
E-mail	josefa.fernandez@unican.es				
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO (S3014)				
Other lecturers					

3.1 LEARNING OUTCOMES
- The student must understand the relationship between the structural properties of powders and their behavior in the handling or processing of these powders.
- He should know how to characterize the porosity, surface area and size of a powder
- He must know the main equipment for the powders processing: types and how they work
- Ability to design the equipment in which operations with solids are carried out, knowing the design parameters
- Ability to select equipment to perform the desired operations with solids according to their characteristics and those of the solid material.

#### 4. OBJECTIVES

The objective of this course is to introduce the subject of particle technology to students of chemical engineering, the basic principles on which the solids operations are based and the basic equipment in these operations, so that they can carry out the design and selection of equipment in the exercise of their profession of Chemical Engineers.

#### 6. SUBJECT PROGRAM

##### CONTENTS

1	Physical and chemical characterization of powders:  Multiple particle systems. Size, Density. Particle size distributions and means, Methods of measurements. Structural properties. Instrumental chemical characterization.
2	Storage and flow of powders. Particle size reduction and enlargement:  Equipments for cohesive and free flowing powders. Design parameters. Models predicting energy requirement and product size distribution. Types of comminution equipments. Size enlargement: fundamentals and equipments.
3	Separation of powders: Mechanical or with fluids. Mixing of powders:  Fundamentals. Equipments for screening. Magnetic and electrostatic separators. Hydraulic classification and concentration. Introduction to mixing powders and pastes.

#### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
The work related to laboratory experiments, visits to chemical industries, or presentations is evaluated all along the semester	Work	No	Yes	50,00
Written exams will also be held .	Written exam	No	Yes	50,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
Written exams including theory and practical exercises will be held and the qualification obtained will be a 50% of the final qualification. The remaining activities, laboratory practices, powerpoint presentations etc., will be a 50% of the final qualification.				
<b>Observations for part-time students</b>				
The final evaluation for part-time students will be similar to the full-time students, with a final exam that will be 60% of the final qualification, the remaining 40% being the result of the evaluation of an individual work assigned during the course, and the completion of an exam or presentation of reports of laboratory practices and visits made.				

**8. BIBLIOGRAPHY AND TEACHING MATERIALS****BASIC**

Warren L. McCabe, Julian C. Smith, Peter Harriot, (1991 y 2007). Operaciones básicas de Ingeniería Química, Edit. McGraw-Hill. Ediciones 6ª y 7ª.

John Metcalfe Coulson, John Francis Richardson, (1993 y 2002). Chemical Engineering. Volume 2. Pergamon Press, Ediciones 4ª y 5ª.

Martin Rhodes, (1990). Principles of powder technology. Edit. Wiley and Sons.

Martin Rhodes, (2008). Introduction to particle technology. Edit. Wiley and Sons. Segunda edición.

Martin Rhodes, (2013). Introduction to particle technology. Edit. Wiley and Sons. Libro electrónico.

Ashok Gupta and Denis Yan, (2006 y 2016). Mineral Processing design and operations. An introduction. Edit. Elsevier.

Jonathan Seville, Ugammaur Tüzün and R. Clift. (1997). Processing of particulate solids. Edit. Blackie Academic & Professional.