

## SUBJECT TEACHING GUIDE

G790 - Particle Science and Technology

Degree in Chemical Engineering

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Degree in Chemical Engineering			Type and Year	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	CRISTINA RUEDA RUIZ LUCIA PEREZ GANDARILLAS				

### 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
- He should know how to design and select some solids processing equipment
- The student should know how to select the best equipment for a powder process

#### 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. COURSE ORGANIZATION

##### 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	40,00
Written exams will also be held .	Written exam	No	Yes	60,00
<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 60% of the final qualification. The remaining activities, laboratory practices, powerpoint presentations etc., will be a 40% 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

Mc Cabe, W.L. Smith, J.C. Harriot, P., Operaciones básicas de la Ingeniería, Edit. McGraw-Hill. Ediciones 6ª y 7ª, (1991 y 2007). Versión electrónica, (1986).

Coulson J.M. Richardson J.F. Chemical Engineering. Volume 2. Pergamon Press, Ediciones 4ª y 5ª, (1993 y 2002).

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

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

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

A. Gupta and D.S. Yan. Mineral Processing design and operations. An introduction. Edit. Elsevier, (2006 y 2016).

Seville. J.P.K; Tuzun, U and Clift R. Processing of particulate solids. Edit. Blackie Academic & Professional, (1997).