

SUBJECT TEACHING GUIDE

G1633 - Sustainable chemical engineering and chemistry

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 OPTION C: GUIDANCE IN ADVANCED CHEMICAL ENGINEERING Optional Module				
Course unit title and code	G1633 - Sustainable chemical engineering and chemistry				
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. INGENIERIAS QUIMICA Y BIOMOLECULAR				
Name of lecturer	MARIA MARGALLO BLANCO				
E-mail	maria.margallo@unican.es				
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. SEMINARIO S2062 (S2062)				
Other lecturers	ENRIQUE ALVAREZ GUERRA JONATHAN ALBO SANCHEZ ESTHER SANTOS SANTAMARIA				

3.1 LEARNING OUTCOMES	
- Sustainability in Chemistry: concept and applications	
- Chemical Engineering and Sustainability	
- Case studies applying the sustainability concept	

4. OBJECTIVES

Knowledge, understanding and applications to simple problems of the sustainability fundamentals in Chemistry and Engineering

6. SUBJECT PROGRAM

CONTENTS

1	<p>PART I. THE SCIENCE OF SUSTAINABILITY Lesson 1. The science of Sustainability - Introduction and evolution of the sustainability science. - Types of sustainability. - Identification of the basic elements of sustainability in chemistry and chemical engineering. - Environmental assessment tools.</p> <p>CASE STUDY 1. Sustainability assessment of and industrial sector. Application of the Life Cycle Assessment CASE STUDY 2. Circular economy: positioning and circular economy examples of the European chemical industry.</p> <p>It will be necessary for students to use their own laptops as the classroom does not have computers.</p>
2	<p>PART II. FROM GREEN CHEMISTRY TO SUSTAINABLE CHEMISTRY Lesson 2. From green chemistry to sustainable chemistry. - Identifying the elements of the transition from green to sustainable chemistry. - The limits of the planet and resource management in the EU. - Identifying the risks of chemicals. - Resource management in the EU.</p> <p>CASE STUDY 3. Challenges of Sustainable Chemistry: Sustainable chemistry strategy in Europe to meet the challenges of the future. CASE STUDY 4. Applying Green Chemistry principles and metrics to the synthesis and production of chemicals.</p>
3	<p>PART III. SUSTAINABLE CHEMISTRY ENGINEERING Lesson 3. Green process engineering and sustainable engineering - Quantitative elements for the sustainability of processes and products. CASE STUDY 5. Sustainable use of renewable resources: biorefineries for the production of biofuels and chemical products.</p>

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Competences development in the class and based on reports and its oral dissemination.	Work	No	Yes	100,00
TOTAL				100,00
Observations				
Evaluation will be based: 30% on participation, motivation and interest in the lectures. 40% on personal work 30% on team work.				
In case team work is not be possible, this mark will be included within the personal work				
Observations for part-time students				
Partial time students are allowed. First year lectures and secon year homework				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Mestres, R. 2011. Química Sostenible. Síntesis, D.L. Madrid, ISBN: 978-84-9756-786-2.

Allen, D.T. and Shonnard D.R. 2011. Sustainable Engineering. Concepts, Design and Case Studies. Upper Saddle River, New Jersey: Prentice Hall, ISBN: 978-0-13-275654-9.