

## SUBJECT TEACHING GUIDE

### 1104 - Eco-Innovation in Industry: Resource and Waste Efficiency

**Master's Degree in Industrial Engineering**  
**Master's Degree in Industrial Engineering Research**

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Master's Degree in Industrial Engineering Master's Degree in Industrial Engineering Research			Type and Year	Optional. Year 2 Optional. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	ADVANCES IN SECURITY AND RESOURCES ASSESSMENT IN INDUSTRY Module - Sustainable Design in Industrial Systems				
Course unit title and code	1104 - Eco-Innovation in Industry: Resource and Waste Efficiency				
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. DE QUIMICA E INGENIERIA DE PROCESOS Y RECURSOS.
Name of lecturer	JAVIER RUFINO VIGURI FUENTE
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO PROFESORES (S3013)
Other lecturers	ALBERTO COZ FERNANDEZ TAMARA LLANO ASTUY

### 3.1 LEARNING OUTCOMES

- Achievement of the aforementioned competences in the field of waste management in industrial activities as well as in the application of the concept of circular economy, which will be developed taking into account i) the problems characteristics in the industrial environment, typically open-ended and unstructured; ii) the high component of multidisciplinary application with holistic visions; iii) the achievement of the confidence and ability of the student to face new problems, emphasizing the ability to argue from rational and ethical criteria; iv) that written technical documentation and oral presentations are important communication skills and one of the bases of success as a professional.

The student is able to perform the synthesis, analysis using advanced modeling, evaluation and optimization of new processing alternatives for the use of material resources in the industry. As part of the learning process, the team collaboration capabilities for solving practical problems in the field of resource recovery industry, as well as oral presentations will be provided.

### 4. OBJECTIVES

Training in aspects of industrial innovation that enables them to:

- Integrate aspects of environmental R&D and innovation in industrial activities and be able to apply tactics of eco-innovation.
- Characterize an industrial waste and implement hierarchical decisions about its management.
- Perform synthesis, analysis, evaluation and optimization of advanced alternative processes for the recovery of resources-wastes in the industry.
- Design, analyze and model reaction systems and mass transfer for the materials recovery.
- Know the aspects of knowledge management in the field of resources and wastes.
- Apply the objectives of the course in an industrial case study developed in group

### 6. SUBJECT PROGRAM

CONTENTS	
1	ENVIRONMENTAL MANAGEMENT, ECO-INNOVATION, CIRCULAR ECONOMY, ENVIRONMENTAL INFORMATION MANAGEMENT and DECISION MAKING TOOLS of WASTE MANAGEMENT and RECOVERY
2	ADVANCED RECOVERY SYSTEMS of WASTES UNDER A CIRCULAR ECONOMY APPROACH :ORGANIC WASTES-BIOMASS. BIOREFINERY. INORGANIC WASTES
3	SYNTHESIS, ANALYSIS, EVALUATION and OPTIMIZATION of ADVANCED ENVIRONMENTAL PROCESSES to the RECOVERY of RESOURCES-WASTES in the INDUSTRY.
4	TEAM/INDIVIDUAL WORK: A CASE STUDY OF ECO-INNOVATION IN INDUSTRY.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Practical clases at laboratory and computer room. Seminars from industry professionals.	Others	No	Yes	30,00
Team work./Individual work. Written and oral presentation.	Work	No	Yes	70,00
TOTAL				100,00
Observations				
During the laboratory and computer practice sessions, students will make a brief report. These reports will be evaluated with 30% of the final grade of the subject. Students who, for justified reasons, cannot regularly attend these practical classes may replace the evaluation part carried out by means of deliverables of specific work in each case.				
Observations for part-time students				
Part-time students may choose between the continuous assessment or assessment in Ordinary/Extraordinary call together work presentation.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
<ul style="list-style-type: none"> <li>- Elias, X., 2009, Reciclaje de Residuos Industriales. 2ª Ed. Diaz de Santos;</li> <li>- Miller, G.T. Jr., Spoolman, S., 2012, Living in the Environment (17 th ed). Belmon, CA: Brooks/Cole;</li> <li>- Nemerow, N., Agardy, F., 2005, Environmental Solutions. Reinhold;</li> <li>- Biegler L., Grossmann I., Sahinidis N., Ydstie B.,2009, New directions for process system engineering. CAPS;</li> <li>- Goldberg, D., Roystob-Browne, A. Composition, production and use of sorbent particles for flue gas desulfurization. 2011, Patent US20110230334.</li> <li>- Renedo M.J., Fernández, J. Procedimiento para la Obtención de un Sorbente Captador de SO2. 2010,Patent 2336636_B1.</li> <li>- Speece, R. E. 1996, Anaerobic Biotechnology for Industrial Wastewaters. Nashville, TN: Archae Press.</li> </ul>