

## SUBJECT TEACHING GUIDE

### 1109 - Models and Support Techniques for Sustainable Design

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

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Master's Degree in Industrial Engineering Research		Type and Year	Optional. Year 1	
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Module - Sustainable Design in Industrial Systems Electroenergetic Module Planning and Sustainable Project Engineering				
Course unit title and code	1109 - Models and Support Techniques for Sustainable Design				
Number of ECTS credits allocated	5	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. TRANSPORTES Y TECNOLOGIA DE PROYECTOS Y PROCESOS			
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Other lecturers	PEDRO DIAZ SIMAL SAUL TORRES ORTEGA			

### 3.1 LEARNING OUTCOMES

- To understand the principles of sustainable development.
- To understand the socio-technical, economic and environmental systems that shape a complex decision-making process.
- To deepen the comprehension of sustainable supply chains and reverse logistics in new industrial configurations .
- To develop skills in eco-innovation and new business models.
- To be able to outline and assess solutions of design according to sustainability criteria on different scales of technical implementation.

#### 4. OBJECTIVES

- To adopt the life cycle and circular thinking in the design stages of projects and products and be able to perceive their economic and environmental consequences.
- Be able to model a complex problem of sustainable design and systems innovation.
- To apply the strategies, methods and tools in which the transition towards a circular economy is supported.
- To develop the critical skills to analyze different case studies.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	Foundations of sustainability, ecosystems and industrial ecology. Strategies for sustainable design. Tools to support the sustainable design and systems innovation: modeling of complex systems, life cycle thinking tools, data-driven decision-making tools. Case studies.
2	Accounting of natural resources. Institutional and Policy framework. Economic growth. Growth and development. Industrial ecology and economic competitiveness. Case studies.
3	Case study focused on logistics and transport networks with regard to manufacturing and supply chains.

#### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Continuous assessment	Others	No	Yes	100,00
TOTAL				100,00
Observations				
In case of a new health alarm by COVID-19 and if the guidelines of the health and educational authorities do not allow face-to-face evaluation in the classroom, a remote evaluation system will be adopted.				
Observations for part-time students				
Part-time students are subject to the same conditions as full-time.				

#### 8. BIBLIOGRAPHY AND TEACHING MATERIALS

##### BASIC

- Azapagic et al. Sustainable Development in Practice: Case Studies for Engineers and Scientists. Adisa Azapagic, Slobodan Perdan, Roland Clift Eds: Wiley; 2004.
- Ayres RU and Ayres LW. A Handbook of Industrial Ecology. Massachusetts: Edward Elgar Publishing Lt; 2002.
- Graedel TE and Allenby BR. Industrial Ecology and Sustainable Engineering. Pearson; 2009.
- Halliday S. Sustainable Construction. Oxford: Butterworth-Heinemann, 2008.
- Zeleny M. Multiple Criteria Decision Making. New York: McGraw-Hill; 1982.
- Malczewski J. GIS and Multicriteria Decision Analysis. New York: John Wiley & Sons; 1999.
- Janssen R. Multiobjective Decision for Environmental Management. Dordrecht: Kluwer Academic. *Revista de Ingeniería y Arquitectura*, Madrid 2005
- Ballou, R. Logística empresarial. Control y planificación. Díaz de santos, 1991