SUBJECT TEACHING GUIDE

M876 - Models and Support Techniques for Sustainable Design

Master's Degree in Industrial Engineering Research

Academic year 2022-2023

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	M876 - Models and Support Techniques for Sustainable Design				
Number of ECTS credits allocated	5	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. TRANSPORTES Y TECNOLOGIA DE PROYECTOS Y PROCESOS
Name of lecturer	JOSE MARIA DIAZ PEREZ DE LA LASTRA
E-mail	josemaria.diaz@unican.es
Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 1. DESPACHO (1007)
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 consecuenques.
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	%
Continuos 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 Academiomía Ambiental y de Los Recursos Naturales ", Madrid 2005
Ballou, R. Logística empresarial. Control y planificación. Díaz de santos, 1991