

SUBJECT TEACHING GUIDE

519 - Sustainable Infrastructures and Circular Economy

Erasmus Mundus Joint Master Degree in Sustainable Design, Construction and Management of the Built Environment

Academic year 2023-2024

1. IDENTIFYING DATA			
Degree	Erasmus Mundus Joint Master Degree in Sustainable Design, Construction and Management of the Built Environment	Type and Year	Compulsory. Year 2
Faculty	School of civil Engineering		
Discipline			
Course unit title and code	519 - Sustainable Infrastructures and Circular Economy		
Number of ECTS credits allocated	6	Term	Semester based (1)
Web			
Language of instruction	English	Mode of delivery	Face-to-face

Department	DPTO. TRANSPORTES Y TECNOLOGIA DE PROYECTOS Y PROCESOS
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3.1 LEARNING OUTCOMES

- To understand the importance of maintenance in the management of infrastructures (IS), in view of Circular Economy (CE).
- To learn the different types of preventive or corrective maintenance (P/CM). To be able to develop a planning of IS maintenance activities. Learn the different types of P/CM and be able to plan its tasks.
- To be able to identify the most common pathologies and failures and to know the different technologies for the maintenance of roads and urban IS
- Understand the importance of carrying out an environmental rating system (ERS) into a company, in view of CE.
- Be familiar with the general concepts of the most common ERS: CEEQUAL, LEED, ENVISION, SIRSDEC, Etc.
- To understand the mobility needs of citizens and the role of transport planning in IS planning and managing systems.
- To learn the most common sustainable mobility policies and traffic management measures.
- To know how Intelligent Transport Systems (ITS) work and their benefits.

4. OBJECTIVES

The main goal of this module is that the student learns the relevance of Sustainability of Infrastructures along their useful life, not only during design and construction, but also during the exploitation period.

The students will learn the main aspects related to infrastructures maintenance and exploitation.

Besides, they will learn the importance of applying environmental rating systems during the design and construction, in order to get the optimum cycle of circular economy.

Finally, the students will learn the aspect related to sustainable mobility in cities, what will ensure their more rational use.

6. COURSE ORGANIZATION

CONTENTS

1	<p>Unit 1. Sustainable maintenance and rehabilitation of infrastructures.</p> <ul style="list-style-type: none"> - General concepts. Relation between the Circular Economy and the maintenance. - The preventive and corrective activities of maintenance. - The most common pathologies and the different technologies for their maintenance .
2	<p>Unit 3. Urban mobility:</p> <p>Introduction.</p> <p>Sustainable Mobility and Transport modelling approaches: Demand models</p> <p>Intelligent Transport Systems and New mobility trends</p> <p>Traffic management and transport policies: towards sustainability</p> <p>Workshop on mobility impact assessment</p> <ul style="list-style-type: none"> - Introduction to Aimsun simulation tool - Network coding and demand data sources - Outputs & Results visualization - Case study analysis and Scenarios
3	<p>Unit 2. ENVIRONMENTAL RATING SYSTEMS.</p> <ul style="list-style-type: none"> - Introduction, General concepts. The Circular economy and the Environmental Rating Systems. - Main aspects to take into account for their implementation in a company. - General characteristics of the most common environmental rating systems, e.g. CEEQUAL, LEED, ENVISION, SIRSDEC, Etc. Case studies.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Written Exam of Unit 1.	Activity evaluation with Virtual Media	No	Yes	10,00
Practical case and Group Discussion of Unit 1.	Work	No	No	15,00
Written Exam of Unit 2	Written exam	No	Yes	25,00
Practical case of Unit 2	Work	No	No	25,00
Continuous assessment of unit 3.	Others	No	No	10,00
Practical case of Unit 3	Work	No	Yes	15,00
TOTAL				100,00
Observations				
<p>Only for duly justified reasons (eg sanitary restrictions) the evaluation tests may be organized remotely, with prior authorization from the Center's Management.</p> <p>Note: According to RD 1125/2003 on the European credit system and the qualification system in university degrees of an official nature and valid throughout the national territory , the Results obtained by the student in each of the subjects of the study plan will be graded based on the following numerical scale from 0 to 10, with an expression of one decimal place, at which you can add its corresponding qualitative rating: 0.0-4.9: Fail (SS) 5.0-6.9: Pass (AP) 7.0-8.9: Good (NT) 9.0-10: Excellent (SB).</p>				
Observations for part-time students				
<p>The student who follows the subject part-time must take a single exam, which will consist of a 1st part (55%) in relation to the partial written tests by modules and a 2nd part (45%) in relation to the practical cases.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Distress Identification Manual for the Long-Term Pavement Performance Program. Publication n°. FHWA-HRT-13-092 Revised May 2014.
Asset Management Data Collection for Supporting Decision Processes. Us Department of Transportation. FHWA.
Pavement Management Applications Using Geographic Information Systems. A Synthesis of Highway Practice. NCHRP SYNTHESIS 335.
Bloetscher, 2019. Public Infrastructure Asset Management, Second Edition. Waheed Uddin, W. Ronald
An Interdependent Infrastructure Asset Management Framework for Public Facilities. Chen Zhong · 2017.
Public Infrastructure Management. Tracking Assets and Increasing System Resiliency. Frederick Bloetscher, 2019.
Public Infrastructure Asset Management, Second Edition. Waheed Uddin, W. Ronald Hudson, Ralph C. G. Haas, 2013.
Data Infrastructure Management. Insights and Strategies. Greg Schulz, 2019.
Adams, K; Hobbs, G (2017). Material Resource Efficiency in Construction: Supporting a circular economy.
Webster, K (2017). The Circular Economy: A Wealth of Flows.
Lacy, P; Rutqvist, J (2015). Waste to Wealth: The Circular Economy Advantage.
Cole RJ (2005) Building environmental assessment methods: redefining intentions and roles. Build Res Inf 35(5):455–467
Ortuzar, J. de D. & Willumsen, L. G. Modelling Transport, 4th ed. Wiley. 2011.
OECD Managing Urban Traffic Congestion. ECMT, 2007.

