



Teaching Guide				
Identifying Data				2023/24
Subject (*)	Water Resources Analysis. Climate Change. and Extreme Events Management		Code	632549014
Study programme	Máster Universitario en Xestión Sostible da Auga			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Obligatory	3
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Civil			
Coordinador	Cea Gomez, Luis	E-mail	luis.cea@udc.es	
Lecturers	Cea Gomez, Luis Puertas Agudo, Jeronimo	E-mail	luis.cea@udc.es jeronimo.puertas@udc.es	
Web				
General description				

Study programme competences / results	
Code	Study programme competences / results
A1	CON1 Describe the principles, concepts, and dimensions that encompass integrated water resources management and its role as a key tool for achieving water security and advancing the associated Sustainable Development Goals (SDGs). Identify problems related to water development, use, and access. Identify and compare water legislation at the European, national, regional, and local levels, as well as interpret conceptual frameworks on sustainable development and their application to the water sector, with a specific focus on the SDGs. Provide tools to explain the economics of water. Enumerate aspects of public taxation that may be relevant in water management.
A5	CON5 Describe the fundamentals of water resources assessment and the main tools for hydrological planning, based on the Water Framework Directive, legislation, and global frameworks for water resource allocation, including the environmental component. Demonstrate that ecosystem services linked to water have high added value and that nature-based solutions enable a sustainable approach to water resource management.
A6	CON6 Identify the risks associated with water, with a special focus on floods and droughts. Provide information on legislation and available technology for managing hydrological risk
A7	CON7 Demonstrate through specific cases that geographic information systems (GIS) are a fundamental tool in water management, applied to the management of water resources. Explain the basic and advanced functionalities of GIS for the development, analysis, and interpretation of hydrological spatial information.
B1	HAB1 Use and compare water legislation and conceptual frameworks related to sustainable development. Operate with tools that allow estimating economic variables (macro and micro) related to water, and employ the tools to apply appropriate taxation and cost policies to water
B4	HAB4 Analyze the European Union's Water Framework Directive and Floods Directive, their technical implications, and their implementation through hydrological planning. Utilize computer tools for problem-solving related to water management within the framework of both directives. Develop measurements and analysis of hydrologically relevant data and data related to the state of water bodies. Evaluate the effect of urban use on the watershed and analyze the consequences of discharging water (treated or untreated) into receiving water bodies. Additionally, develop strategies to protect areas of surface water and groundwater generation within watersheds, based on the principle of recognizing and enhancing ecosystem services.
C4	COM4 Integrate the various sources that generate the water supply and the uses that create the demand into systems or balances that allow for proper management. Plan the water resource at both macro and micro scales, allocating water to different uses while integrating environmental and social demands
C5	COM5 Evaluate the impact of floods and droughts and propose strategies to mitigate them in accordance with legislation, applying new technologies. Propose sustainable and socially acceptable solutions.
C6	COM6 Integrate diverse data sources into decision frameworks to facilitate improved management of water resources



Learning outcomes			
Learning outcomes		Study programme competences / results	
		AJ1 AJ5 AJ7	CJ6
		AJ1 AJ5	BJ1 CJ5
		AJ5 AJ7	CJ4 CJ6
		AJ6	CJ5
		AJ6	BJ4 CJ5

Contents	
Topic	Sub-topic
1. Evaluación de los recursos hídricos	1.1. Precipitación, infiltración, evapotranspiración 1.2. Estimación de aportación de agua superficial 1.3. Bases de datos globales para la evaluación del recurso hídrico 1.4. Balance hídrico
2. Cambio climático	2.1. Evolución histórica del clima 2.2. Panel Intergubernamental para el Cambio Climático (IPCC). Informes 2.3. Análisis de tendencias climáticas pasadas 2.4. Proyecciones futuras de clima. CMIP6
3. Gestión de inundaciones	3.1. Directiva Europea de Evaluación y Gestión del Riesgo de Inundación 3.2. Evaluación Preliminar del Riesgo de Inundación 3.2. Mapas de Peligrosidad y Riesgo de Inundación 3.3. Planes de Gestión del Riesgo de Inundación 3.4. El Sistema Nacional de Cartografía de Zonas Inundables
4. Gestión de sequías	4.1. Indicadores e índices de sequía 4.2. Planes de Gestión de Sequías

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
ICT practicals	A7 B4 C4 C6	10	28	38
Multiple-choice questions	A1 A5 A6 A7 B1 B4 C4 C5 C6	1	6	7
Guest lecture / keynote speech	A1 A5 A6 A7 B1 B4 C4 C5 C6	10	15	25
Personalized attention		5	0	5

(\*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	Description
ICT practicals	Se realizarán prácticas sobre la evaluación de recurso hídrico en cuencas reales y sobre cálculo de índices de sequía, utilizando bases de datos globales y observaciones reales, que serán analizadas con herramientas SIG (Q-GIS) y mediante aplicaciones de programación (Python o Matlab). Se tendrán en cuenta en la evaluación final.
Multiple-choice questions	Se realizará una prueba teórica de respuesta múltiple al finalizar el curso, sobre los contenidos explicados en clase, y cuyo resultado se tendrá en cuenta en la evaluación final.



Guest lecture / keynote speech	Se desarrollarán los contenidos teóricos de la asignatura en clase, apoyándose con medios audiovisuales.
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### Personalized attention

Methodologies	Description
ICT practicals	Para el desarrollo de las prácticas se fijarán unas horas de tutoría individual para resolver dudas fuera de clase.

### Assessment

Methodologies	Competencies / Results	Description	Qualification
ICT practicals	A7 B4 C4 C6	Se entregará un informe describiendo la metodología utilizada en las prácticas y un análisis crítico de los resultados obtenidos.	75
Multiple-choice questions	A1 A5 A6 A7 B1 B4 C4 C5 C6	Se realizará un examen al finalizar la asignatura	25

### Assessment comments

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### Sources of information

Basic	
Complementary	

### Recommendations

#### Subjects that it is recommended to have taken before

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#### Subjects that are recommended to be taken simultaneously

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#### Subjects that continue the syllabus

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#### Other comments

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(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.