Teaching Guide				
Identifying Data				2015/16
Subject (*)	Water supply and drainage systems		Code	632844202
Study programme	Mestrado Universitario en Enxeñaría da Auga (plan 2012)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Obligatoria	6
Language	English			
Teaching method	Face-to-face			
Prerequisites				
Department	Dereito Público EspecialEconomía Aplicada 1Métodos Matemáticos e de RepresentaciónTecnoloxía da Construción			
Coordinador	Naves García-Rendueles, Acacia	E-mail	acacia.naves@udc.es	
Lecturers	Martinez Lopez, Alberto Naves García-Rendueles, Acacia Rodríguez-Vellando Fernández-Carvajal, Pablo Sanz Larruga, Francisco Javier Vazquez Herrero, Cristina Mercedes	E-mail	alberte.martinez@udc.es acacia.naves@udc.es pablo.rodriguez-vellando@udc.es javier.sanz.larruga@udc.es c.vazquezh@udc.es	
Web	caminos.udc.es/info/asignaturas/201/masterindex.html			
General description	Historical introduction to water supply and sewer systems. Water catchment and drinking water treatments. Water supply networks: general concepts, description and design. Sewer systems: general concepts , description and design. Sustainable drainage systems (SUDS). Waste water treatments prior to discharge to the aquatic media. Legal framework.			

Study programme competences / results	
Code	Study programme competences / results
A17	A global vision of water supply by the distinct elements which form it, at the same time having the necessary knowledge for its basis dimensioning and technological aspects related to its management and constructive implementation
A24	Capacity to design and manage the water supply and treatment in a population area, including design and Project for solutions regarding water treatment, drainage, and advanced management of residual waters in the city. Knowledge regarding advanced processes for the water treatment, elimination of nutrients, and management strategy in times of rainwater
B1	To resolve problems effectively
B2	To apply critical thinking, logic and creativity
B3	To work individually with initiative
B4	To communicate effectively in work surroundings
B5	Continuous recycling of knowledge in a general perspective in a global situation of water engineering
B6	Understanding of the need to analyse history to understand the present
B7	Facility to integrate in multidiscipline teams
B8	Capacity to organize and plan
B9	Capacity for analysis, synthesis and structure of information and ideas
C1	To understand the importance of the enterprising culture and to know the means at the reach of the enterprising people
C2	To value knowledge critically, technology and available information to resolve problems that they will face
C3	To assume as a professional and citizen the importance of learning throughout life
C4	To value the importance of the investigation, innovation and technology development in the social ?economic advance and cultural in society
C5	To posses and understand knowledge that gives a base or oportunity to be original in the development and for applications of ideas, often in the context of investigation
C6	The students must be able to apply the acquired knowledge and their capacity to resolve problems in new surrandings or not well known within wider contexts (or multidiscipline) related with the study area
C7	The students must be able to integrate knowledge and to affront the complexity to formulate judgements from information that, been incomplete or limited, include reflexions about social responsabilities and ethics related to the application of the knowledge and judments

C8	The students must be able to comunicate their conclusions, knowledge and the last reasons that support them, to spezialated publics and not spezialated in a clear and unambiguous way.
C9	The student must possess the learning ability with permits them to continues to study in a manner wich will be in a great measure self directed and individual

Learning outcomes			
Learning outcomes	Study programme competences / results		
Overview of water supply and sanitation systems through their components	AC17	BC1 BC2 BC3 BC4 BC5 BC6 BC7 BC8 BC9	CC1 CC2 CC3 CC4 CC5 CC6 CC7 CC8 CC9
Ability to design solutions and basic dimensioning water catchment, drinking water treatment , water supply networks, sewer systems, wastewater treatment and systems of urban water.	AC17 AC24	BC1 BC2 BC3 BC4 BC5 BC7 BC8 BC9	CC1 CC2 CC3 CC4 CC5 CC6 CC7 CC8 CC9
Ability to design solutions and basic dimensioning water catchment, water treatment, water supply, sewer systems, waste water treatment and SUDS	AC17 AC24	BC1 BC2 BC3 BC4 BC5 BC6 BC7 BC8 BC9	CC1 CC2 CC3 CC4 CC5 CC6 CC7 CC8 CC9

Contents	
Topic	Sub-topic
1. Introduction to water supply and sanitation systems.	1.1. Overview of water catchment systems and water supply 1.2. Overview of sewer systems and wastewater treatments 1.3. Overview of the surface runoff management 1.4. Historical introduction to supply and sewer systems
2. Water catchment systems and drinking water treatments.	2.1. Catchment of surface water: rivers, lakes, reservoirs ... 2.2. Spring catchments 2.3. Groundwater catchment 2.4. Drinking water purification treatments 2.5. Wastewater treatment plant

3. Water supply networks	3.1. General concepts 3.2. Description 3.3. Design
4. Sewer systems	4.1. General concepts 4.2. Description 4.3. Design
5. Sustainable drainage systems	5.1. Runoff management 5.2. Structures of runoff detention and treatment
6. Waste water treatment	6.1. Wastewater treatment 6.2. Wastewater treatment plants 6.3. Discharge to the receiving environment
7. Legal Framework	7.1. European legal framework

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A17 A24 B1 B2 B5 B6 B7 B9 C1 C2 C3 C4 C5 C6 C7 C8 C9	60	51	111
ICT practicals	A17 A24 B1 B2 B3 B4 B8 B9 C2 C3 C4 C5 C6 C7 C8 C9	4	5	9
Collaborative learning	A24 B1 B2 B3 B4 B7 B8 B9 C1 C2 C3 C4 C5 C6 C7 C8 C9	4	5	9
Problem solving	A17 A24 B1 B2 B3 B4 B7 B8 B9 C1 C2 C3 C4 C5 C6 C7 C8 C9	2	4	6
Field trip	A17 B2 B5 B6 B7 B8 B9 C1 C2 C3 C4 C5 C6 C7 C8 C9	5	0	5
Personalized attention		10	0	10
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Regular lectures where the main theoretical contents of the subject are regarded. Practical examples and real cases are shown also.
ICT practicals	Design and dimension of components of supply and sewer systems by usign technical software.
Collaborative learning	Go in depth in supply and sewer systems design methodologies by appliying them in a practical case. Working will be divided between groups and shared at the end.
Problem solving	Solution of problems proposed by the theachers to strengthen theoretical concepts.
Field trip	Visit to drinking water and/or wastewater treatment in A Coruña.

Personalized attention	
Methodologies	Description

ICT practicals Guest lecture / keynote speech Collaborative learning Problem solving	Answering of questions arising from the theoretical contents exposed in class and problem resolution. Monitoring of collaborative tasks .

Assessment			
Methodologies	Competencies / Results	Description	Qualification
ICT practicals	A17 A24 B1 B2 B3 B4 B8 B9 C2 C3 C4 C5 C6 C7 C8 C9	Resolution of proposed exercises	15
Guest lecture / keynote speech	A17 A24 B1 B2 B5 B6 B7 B9 C1 C2 C3 C4 C5 C6 C7 C8 C9	Multiple choice and/or short questions final exam about the theoretical contents of the subject.	60
Collaborative learning	A24 B1 B2 B3 B4 B7 B8 B9 C1 C2 C3 C4 C5 C6 C7 C8 C9	Development of the proposed tasks and public exposition.	15
Problem solving	A17 A24 B1 B2 B3 B4 B7 B8 B9 C1 C2 C3 C4 C5 C6 C7 C8 C9	Resolution of proposed problems	10

Assessment comments

Sources of information	
Basic	- Woods Ballard, B et al (2006). SUDS Manual - Guidance on design and construction. London: CIRIA - Tchobanoglous, G et al (2002). Wastewater Engineering: Treatment and Reuse. Mc Graw Hill - Bhave, P R (2008). Optimal design of water distribution networks. Alpha Science International
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Physico-chemistry and quality of water/632844203
Subjects that continue the syllabus
Other comments

(*)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.