



## Teaching Guide

Identifying Data				
Subject (*)			Code	2019/20
Water supply and drainage systems			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	Obligatory	6
Language	English			
Teaching method	Face-to-face			
Prerequisites				
Department	Dereito PúblicoEconomíaEnxeñaría CivilMatemáticas			
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		E-mail	alberte.martinez@udc.es acacia.naves@udc.es pablo.rodriguez-vellando@udc.es javier.sanz.larruga@udc.es
Web	caminos.udc.es/info/assignaturas/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
------	---------------------------------------

## Learning outcomes

Learning outcomes	Study programme competences / results		
Overview of water supply and sanitation systems through their components			
Overview of water supply and sanitation systems through their components			
Ability to design solutions and basic dimensioning water catchment, drinking water treatment , water supply networks, sewer systems, wastewater treatment and systems of urban water.			
Ability to design solutions and basic dimensioning water catchment, drinking water treatment , water supply networks, sewer systems, wastewater treatment and systems of urban water.			
Ability to design solutions and basic dimensioning water catchment, water treatment, water supply, sewer systems, waste water treatment and SUDS			
Ability to design solutions and basic dimensioning water catchment, water treatment, water supply, sewer systems, waste water treatment and SUDS			

## Contents

Topic	Sub-topic
1. Introduction to water supply and sanitation systems.	1.1. Historical introduction to supply and sewer systems 1.2. Characteristics of nowadays water services 1.3. Overview of water catchment systems and water supply 1.4. Overview of sewer systems and wastewater treatments 1.5. Overview of the surface runoff management



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 treatment
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. Non conventional sustainable urban drainage systems	5.1. Runoff management 5.2. Structures of runoff detention and treatment
6. Legal Framework	6.1. European legal framework

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student's personal work hours	Total hours
Guest lecture / keynote speech		30	5	35
Collaborative learning		15	5	20
Document analysis		2	10	12
Oral presentation		2	5	7
Problem solving		6	2	8
ICT practicals		8	8	16
Field trip		8	4	12
Objective test		6	4	10
Student portfolio		0	15	15
Personalized attention		15	0	15
(*)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	Lectures where the main theoretical contents of the subject are regarded. Practical examples and real cases are shown also.
Collaborative learning	Go in depth in supply and sewer systems elements and design methodologies. Working will be divided between groups and shared at the end.
Document analysis	Individual review of documentation as introduction to concepts or as review and deepening methodology. The understanding and assimilation of the main ideas should be shown in a collaborative learning activity or in an objective test.
Oral presentation	Preparation of a poster or a set of slides and oral presentation at class. Not only the contents are evaluated but the prepared material and the performance.
Problem solving	Solution of problems proposed by the teachers to strengthen theoretical concepts.
ICT practicals	Design and dimension of components of supply and sewer systems by using technical software.
Field trip	Visit to drinking water and/or wastewater treatment in A Coruña Visit to works on a water supply or sewerage system
Objective test	Multiple choices or true/false tests answered individually or in groups.
Student portfolio	Document which consists on the compilation of activities performed during all the subject which should be presented at the end of the semester.

Personalized attention
------------------------



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

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Oral presentation		Short oral presentation of a subject at class using support material (poster or slides).	15
Student portfolio		Document which consists on the compilation of activities performed during all the semester	25
Collaborative learning		Development of the proposed tasks and conclusions exposition.	25
Objective test		Multiple choice or true/false tests	20
ICT practicals		Resolution of proposed simulations using technical software.	15

Assessment comments

Sources of information	
<b>Basic</b>	<p>Advanced water distribution modeling and management. Haestad Methods, Thomas M. Walski...[et al.]  <a href="http://kmelot.biblioteca.udc.es/search~S8*gag?/dAgua+++Depuraci{226}on./dagua+depuracion/-3%2C-1%2C0%2CB/frameset&amp;FF=dagua+distribucion&amp;6%2C%2C30">http://kmelot.biblioteca.udc.es/search~S8*gag?/dAgua+++Depuraci{226}on./dagua+depuracion/-3%2C-1%2C0%2CB/frameset&amp;FF=dagua+distribucion&amp;6%2C%2C30</a> Analysis of water distribution networks. P.R. Bhawe, R. Gupta.  <a href="http://kmelot.biblioteca.udc.es/search~S8*gag?/dAgua+++Depuraci{226}on./dagua+depuracion/-3%2C-1%2C0%2CB/frameset&amp;FF=dagua+distribucion&amp;8%2C%2C30">http://kmelot.biblioteca.udc.es/search~S8*gag?/dAgua+++Depuraci{226}on./dagua+depuracion/-3%2C-1%2C0%2CB/frameset&amp;FF=dagua+distribucion&amp;8%2C%2C30</a> Design of water supply pipe networks. Prabhata K. Swamee, Ashok K. Sharma.  <a href="http://kmelot.biblioteca.udc.es/search~S8*gag?/dAgua+++Depuraci{226}on./dagua+depuracion/-3%2C-1%2C0%2CB/frameset&amp;FF=dagua+distribucion&amp;10%2C%2C30">http://kmelot.biblioteca.udc.es/search~S8*gag?/dAgua+++Depuraci{226}on./dagua+depuracion/-3%2C-1%2C0%2CB/frameset&amp;FF=dagua+distribucion&amp;10%2C%2C30</a> Urban Drainage. 3rd Ed. Butler y Davies (2011). Taylor Francis.  <a href="http://kmelot.biblioteca.udc.es/search~S8*gag?/turban+drainage/turban+drainage/1%2C3%2C4%2CB/frameset&amp;FF=turban+drainage&amp;2%2C%2C2/indexsort=-">http://kmelot.biblioteca.udc.es/search~S8*gag?/turban+drainage/turban+drainage/1%2C3%2C4%2CB/frameset&amp;FF=turban+drainage&amp;2%2C%2C2/indexsort=-</a> Wastewater hydraulics theory and practice. Hager (2010). Springer.  <a href="http://kmelot.biblioteca.udc.es/search~S8*gag?/twastewater+/twastewater/1%2C25%2C27%2CB/frameset&amp;FF=twastewater+hydraulics+theory+and+practice&amp;1%2C%2C2/indexsort=-">http://kmelot.biblioteca.udc.es/search~S8*gag?/twastewater+/twastewater/1%2C25%2C27%2CB/frameset&amp;FF=twastewater+hydraulics+theory+and+practice&amp;1%2C%2C2/indexsort=-</a> EPANET:  <a href="https://www.epa.gov/water-research/epanetSWMM">https://www.epa.gov/water-research/epanetSWMM</a>:  <a href="https://www.epa.gov/water-research/storm-water-management-model-swmm">https://www.epa.gov/water-research/storm-water-management-model-swmm</a>ITOGH Instruccións Técnicas para Obras Hidráulicas en Galicia.  <a href="http://augasdegacia.xunta.gal/seccion-tema/c/Obras_AHG_saneamento_depuracion?content=/Portal-Web/Contidos_Augas_Galicia/Secciones/itohg/seccion.html&amp;std=itohg.html">http://augasdegacia.xunta.gal/seccion-tema/c/Obras_AHG_saneamento_depuracion?content=/Portal-Web/Contidos_Augas_Galicia/Secciones/itohg/seccion.html&amp;std=itohg.html</a></p>
<b>Complementary</b>	

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.