



Teaching Guide

Identifying Data				
			2013/14	
Subject (*)	Enxeñaría da auga subterránea	Code	632844207	
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	Optativa	6
Language	English			
Prerequisites				
Department	Tecnoloxía da Construción			
Coordinador	Juncosa Rivera, Ricardo	E-mail	ricardo.juncosa@udc.es	
Lecturers	Juncosa Rivera, Ricardo Padilla Benitez, Francisco Soriano Hoyuelos, Gemma	E-mail	ricardo.juncosa@udc.es francisco.padilla@udc.es gemma.soriano@udc.es	
Web				
General description				

Study programme competences

Code	Study programme competences
A15	Descricións e equilibrados aspectos básicos e aplicados da Hidrogeología das necesidades de enxeñaría civil. Habilidade para deseñar e interpretar os experimentos caracterización hidrodinámico hidráulico do medio, interpretación de mapas hidrogeolóxicos e aprender formas constructivas de depósitos
B1	Resolver problemas de forma eficaz
B2	Aplicar crítica, pensamento lóxico e creativo
B3	Traballar de forma independente coa iniciativa
B4	Informar-se eficazmente en un ambiente de traballo
B5	Reciclaxe continua de coñecementos nunha perspectiva xeral no ámbito de acción global da Enxeñaría de Auga
B6	Compresión da necesidade de considerar a historia para entender o presente
B7	Fácil integración en equipos multidisciplinares
B8	Habilidade para organizar e planificar
B9	Capacidade de síntese, análise e estrutura de información e ideas
C1	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
C2	Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.
C3	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C4	Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común.
C5	Entender a importancia da cultura emprendedora e coñecer os medios ao alcance das persoas emprendedoras
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C7	Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

Learning outcomes

Subject competencies (Learning outcomes)	Study programme competences



Overview of basic and applied aspects of hydrogeology from needs of civil engineering. Ability to design and interpret the hydraulics tests and hydrodynamic characterization of medium, interpreting hydrogeological maps and constructive ways of sources	AC15	BC1 BC2 BC3 BC4 BC5 BC6 BC7 BC8 BC9	CC1 CC2 CC3 CC4 CC5 CC6 CC7 CC8
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Contents	
Topic	Sub-topic
Introduction to the Hydrologic Cycle	Components Evapotranspiration and potential Evapotranspiration Infiltration and recharge Baseflow
Geologic materials	Continental environments: erosion, transportation and deposition Kind of deposits: fluvial, eolian, lacustrine and glacial Uplift, diagenesis and erosion Tectonism and the formation of fractures
Ground water movement	Basic concepts Darcy's experimental law and field extensions Properties: porosity and hydraulic conductivity Field Mapping Flow in fractured rocks
Main equations of flow	Conservation of fluid mass The storage properties of porous media Boundary conditions and flow nets
Flow in the unsaturated zone	Richards' equation Unsaturated flow in fractured rocks
Solute and particle transport	Advection Basic concepts of dispersion: diffusion and mechanical dispersion
Principles of aqueous geochemistry	Aqueous systems Equilibrium versus kinetic descriptions Equilibrium models of reaction Kinetic reactions Ground water composition
Chemical reactions	Homogeneous reactions: Acid-base reactions, complexation reactions, oxidation-reduction reactions Heterogeneous reactions: dissolution/precipitation, reactions on surfaces
Saline water/ Sweet Water interface	Saline intrusion Methods
Hydraulic testing	Conventional hydraulic testing Single borehole test hydraulic testing in fractured or low permeability rocks Others methods of testing



Ground water as a resource	Land subsidence Coastal aquifers drainage on slopes road drainge dams
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Planning			
Methodologies / tests	Ordinary class hours	Student?s personal work hours	Total hours
Seminar	30	30	60
Guest lecture / keynote speech	30	30	60
Personalized attention	30	0	30

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

Methodologies	
Methodologies	Description
Seminar	Practical lectures related to the theoretical aspects regarded at the magistral lectures
Guest lecture / keynote speech	Regular lectures where the main theoretical contents of the subjects are regarded

Personalized attention	
Methodologies	Description
Guest lecture / keynote speech Seminar	Pernalized attention to be provided for the seminars

Assessment		
Methodologies	Description	Qualification
Guest lecture / keynote speech	The knowledge of the concepts developed at the magistral lectures will be assesed and considered for the final mark	50
Seminar	The attendance to the seminars and the work being developed at the seminars will be considered for the final mark	50

Assessment comments

Sources of information	
Basic	<ul style="list-style-type: none"> - (). . - Fieter, C.W. (2001). Applied hydrogeology. Prenice hall - Feiter, C.W. (1999). Contaminant Hydrogeology. Prenice hall - Bear, J. (1972). Dynamics of fluids in porous media. American Elsevier - Bear, J. (1979). Hydraulics of groundwater. Mc Graw Series in water resources and environmental engineering - Weight, Willis D. (2009). Hydrogeology field manual. Mc Graw Hill - Domenico, P.A. and Schwartz, F.W. (1990). Physycal and chemical hydrogeology. Wiley
Complementary	

Recommendations
Subjects that it is recommended to have taken before



Subjects that are recommended to be taken simultaneously
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.