

SUBJECT TEACHING GUIDE

M2099 - HYDRAULIC WORKS

Master's Degree in civil Engineering, Canal and Port Engineering

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Master's Degree in civil Engineering, Canal and Port Engineering			Type and Year	Compulsory. Year 2
Faculty	School of civil Engineering				
Discipline	HYDRAULIC WORKS				
Course unit title and code	M2099 - HYDRAULIC WORKS				
Number of ECTS credits allocated	4,5	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. CIENCIAS Y TECNICAS DEL AGUA Y DEL MEDIO AMBIENTE
Name of lecturer	ANDRES GARCIA GOMEZ
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Other lecturers	JOAQUIN DIEZ-CASCON SAGRADO

3.1 LEARNING OUTCOMES

- To describe the different types of dams.
- To identify the key actions on a gravity concrete dam analyzing their influence on its stability.
- To describe the different elements that make up spillways, intake structures and bottom outlets.
- To analyze the hydraulic behavior of spillways.
- To design a stilling basin.
- To identify the different types of water wells.
- To identify and design the main constituent elements and describe the main construction methods of a drilled well.
- To analyze the hydraulic behavior and design longitudinal drains under the bottom of a lined canal.
- To describe the specific construction aspects of concrete and asphalt lined canals.
- To identify the most relevant aspects in the layout of a canal and describe the existing solutions for crossing a trough.
- To describe the main characteristics of pipe materials and valves that are commonly used in civil engineering applications for pressure pipelines.
- To determine the forces that occur on special pressure pipeline components (elbows, branches, valves).
- To identify and describe the different constituent elements of pump and turbine stations.
- To select the type and characteristics of the pump to place in a particular installation calculating its maximum location level.
- To determine the flow discharged by one or more pumps connected in series or in parallel.

4. OBJECTIVES

To ensure that students acquire sufficient skills to start to develop their work , in the field of Hydraulic Engineering, in the different stages of the project, construction and operation of the main hydraulic infrastructures.

6. COURSE ORGANIZATION

CONTENTS	
1	DAMS. General concepts and types of dams. Gravity dams. Embankment dams. Dam spillways. Bottom outlets and intakes.
2	WATER WELLS. Drilled wells: constituent elements, drilling methods, well hydraulics, pumping tests, well yield, well design. Dug wells. Colector wells.
3	HYDRAULIC CANALS. Canal layout and typical cross sections. Transitions. Inverted siphons and aqueducts. Canal drainage. Canal lining: concrete and asphalt linings.
4	PRESSURE PIPELINES. Types of materials for pressure pipelines and types of connections used between them . Types of valves. Special pipeline components. Hydraulic design: steady state and water hammer.
5	TURBOMACHINERY. Pumps and turbines. Pump selection. Suction head. Modification of the pump operating point. Pumps in series and in parallel.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Midterm exam	Written exam	No	Yes	25,00
Final exam	Written exam	Yes	Yes	25,00
Course work (midterm exam contents)	Work	No	Yes	25,00
Course work (final exam contents)	Work	No	Yes	25,00
TOTAL				100,00
Observations				
<p>As accorded by the relevant committees, as a general rule, and unless stated otherwise anywhere in this guide:</p> <ul style="list-style-type: none"> - A student cannot request a reexamination if the original grade obtained in the evaluation was not a fail . - The reexamination activity will take the same form than the original evaluation activity. <p>Grades are measured on a numeric scale going from 0 to 10, where values smaller than 5 are a Fail.</p> <p>Marks obtained in the course evaluation activities will be kept until the re-sit examination period.</p> <p>Only for duly justified reasons (eg sanitary restrictions) the evaluation tests may be organized remotely, with prior authorization from the Center's Administration.</p>				
Observations for part-time students				
Part-time students will need to assist to the final exam of the subject and complete the course work activities.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
<ul style="list-style-type: none"> - Chow, V.T. (1982). Hidráulica de los canales abiertos. Editorial Diana. - Liria Montañés, J. (2001). Canales hidráulicos: proyecto, construcción, gestión y modernización. Ed. Colegio de Ingenieros de Caminos, Canales y Puertos. Colección Senior. - Mateos de Vicente, M. (1990). Válvulas para abastecimiento de agua. Librería Técnica Bellisco. Madrid. - Mateos de Vicente, M. (2009). Válvulas de retención y otras válvulas afines. Librería Técnica Bellisco. Madrid. - Mayol, J.M. (1983). Tuberías. Tomo I: Materiales, cálculos hidráulicos, cálculos mecánicos. Editores Técnicos Asociados. Barcelona. - Michael, A.M. (2008). Water wells and pumps. Ed. McGraw-Hill. Nueva York. - Pimienta, J. (1973). La captación de aguas subterráneas. Editores Técnicos Asociados. Barcelona. - Suárez. L.M. (1982). Ingeniería de presas: Obras de toma, descarga y desviación. Ediciones Vega. Caracas. - Vallarino, E. (2006). Tratado básico de presas (tomos I y II). Ed. Colegio de Ingenieros de Caminos, Canales y Puertos. Colección Senior.