INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Applied Hydraulics II			Field of study	Hydraulics and Hydric Resources		
Bachelor in	Civil Engineering			School	School of Technology and Management		
Academic Year	2023/2024	Year of study	3	Level	1-3	ECTS credits	6.0
Type	Semestral	Semester	2	Code	9089-322-3202-00-23		

Workload (hours)	162	Contact hours	T	-	TP	58	PL	-	TC	-	S	-	E	-	OT	-	O	2

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): Carlos Liberal Moreno Afonso

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Identify the basis of quantity of hydraulic works projects and transfer these methods for the determination of capitation, consumption and discharge
2. Recognize the main characteristics of the different organs of a system of water supply and distribution of water and employ the project procedures to the various hydraulic scenarios
3. Identify normative requirements and the construction techniques of the various constituent organs of a system of water supply and distribution of water
4. Knowing how to classify the types of flow and the corresponding limitations of design as the emergence of extreme pressures
5. Using the methods studied in the design of the main organs of a system of water supply or distribution of water and produce the necessary elements for the elaboration of a project

Prerequisites

Before the course unit the learner is expected to be able to:
1. Perform function analysis and numerical, integral, differential and vector calculations
2. Have knowledge of linear algebra and analytical geometry
3. Apply the concepts of general and applied hydraulics

Course contents

Framework; Hydrological Cycle; Captation of water; Base Elements; Project horizon or life of the project; Evolution study of population; Adduction; Reservoirs; The water distribution system; Hydraulic transients; Rehabilitation of pipelines; Notions of water quality.

Course contents (extended version)

1. Chapter I - Introduction
   - Framework; Hydrological Cycle; Captation of Water.
2. Chapter II - Basic Elements
   - Introduction; The Horizon of Project or Project Lifetime.
   - Study of Evolution of Population.
   - Available Data; Methods of Demographic Projection.
   - Distribution of Population and Density to consider.
3. Chapter III - Adduction
   - Introduction; General rules on the trace in plant and in profile; Types of tubes and joints.
   - Load Calculation of Losses in Pipes.
4. Chapter IV - Reservoirs
   - Introduction; Classification and Purpose of the Reservoirs; Distribution staggered or by floors.
5. Chapter V - Systems of Water Distribution
   - Introduction; The Traced and Types of Distribution Networks.
   - Previous Conditions to Dimensioning Network; Pressures necessary in Pipes for Distribution.
6. Chapter VI - Hydraulic transients
   - Classification of the flow. Definitions; Introduction.
   - Simplified Analysis of Hydraulic Shock: Introduction; Speed; Gravitational Adduction.
   - Adduction by Pumping: Introduction; Calculating the value of Ta: Method Mendiluce Rosich.
   - Method Betâmio de Almeida; Procedure to adopt.
   - Facilities for Shock Protection Hydraulic.
7. Chapter VII - Rehabilitation of Pipelines
   - Introduction; Rehabilitation of Pipelines; Techniques for Rehabilitation of Pipelines.
8. Chapter VIII - Getting Water Quality
   - Parameters for characterization of a body of water; Features Organoleptic.

Recommended reading

1. SÁ MARQUES, J. A. A. e SOUSA, J. J. O. – Hidráulica Urbana. Sistemas de Abastecimento de Água e de Drenagem de Águas Residuais, 3ªedição, Coimbra, Imprensa da Universidade de Coimbra, 2011.
2. ROBERSON, J. A. , CASSIDY, J. J. e CHAUDHRY, M. H. – Hydraulic Engineering. N. York, John Wiley & Sons, Inc, 1998.
3. QUINTELA, A. C. – Hidráulica, 6ªedição, Lisboa, Fundação Calouste Gulbenkian, 1998.

Teaching and learning methods

The unit curriculum will be taught using expository lessons and practical classes for resolution of exercises.

Assessment methods

- Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 100%

Language of instruction

Portuguese

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Electronic validation

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