School of Agriculture
Course Unit Syllabus

Level of qualification:
Short cycle (TESP)
Study cycle:
Environmental Protection Systems

Course Unit: **223522 – Water Distribution Systems**

Year 2 **Semester 3** **ISCED Code: 712** **ECTS: 5,0**

Tipe of Course Unit: Compulsory **Delivery Mode:** Face-to-face **Language of Instruction:** Portuguese

COURSE COORDINATOR: Anabela Cândida Ramalho Durão

HOURS OF WORK

TOTAL HOURS	Contact Hours								Hours in autonomous work
	Theory	Theory and practice	Practical and laboratory work	Field work	Seminar	Internship	Tutorial guidance	Other	
125		**15**	**45**						**65**

Prerequisites (if applicable): Not applicable

LEARNING OUTCOMES (knowledge, skills and competence)

To identify the water sistems facilities, including material, equipments and accessories

To identify and recognize the importance of pump stations;

To identify and characterize the functionalities of maneuvering and safety devices;

To identify the functionalities and recognize the importance of reservoirs;

To identify and control water losses occurring in the water supply system;

To apply procedures for data records;

To interpret the information of the equipment indicators;

To analyze and evaluate the reality of water losses and define the strategic objectives.

To contribute to resource efficiency and sustainnability of the water supply sector.

CONTENTS

1-Water supply systems.

System components (from intake to water distribution). Concepts. Terminologies. Features and functionalities of each component. Flow estimation for each component

2- Types of flow: free surface and flow in pressure. Hydraulic operating conditions (speeds, diameters, material, pressure). Load losses (continuous and localized). Power line and piezometric. Flow and pressure measurement instruments. Determination of the economic diameter.

3- Analysis of Water Consumption: Importance of water loss assessment; Performance indicator for water supply services; Active leak control; Techniques for rehabilitation of pipelines for water supply and water distribution; Types of networks; Accessories needed in a water distribuition network.

DEMONSTRATION OF THE CONTENTS COHERENCE WITH THE COURSE UNIT'S LEARNING OUTCOMES

In this couse, the student is expected to know the water distribution from intake to the network distribution systems, including equipment, pump station, materials, and therefore the programmatic contents were selected with this objective in mind, addressing the theoretical and practical questions to estimate the necessary pipelines, to identify the types of flow, to evaluate the water losses, contributing to the efficiency of the water resources.

TEACHING METHODOLOGIES

Expositive, demonstrative methods (with the accomplishment of exercises of application, participatory methods and work in group with case study.

DEMONSTRATION OF THE COHERENCE BETWEEN THE TEACHING METHODOLOGIES AND THE LEARNING OUTCOMES

The teaching methodologies adopted: the expository methodology for the fundamental concepts related to water supply systems, flow types; demonstration methodology with learning through videos, study visits and to identify the equipment, materials and accessories needed for the water supply system, and water consumption assessment; the participatory methodology that requires an interactive exposition with the students and the accomplishment of group work, to evaluate the water consumptions, constituting the case study, allows to reach the main objective of this course, contributing to the efficiency of the use of the resources in the water supply sector.

EVALUATION METHODS

1- Continuous evaluation: two frequencies and practical works (PW) (in group or / and individual)

2- Evaluation by Examination and practical works

The final grade will be calculated based on the following equation for continuous assessment:

G = 0.4 * Mean of PW + 0.6 (F1 + F2) / 2

Or for examination evaluation:

G = 0.4 * Mean of TP + 0.6 E

At where:

PW- Practical Work

F - Frequency

E - Exam

MAIN BIBLIOGRAPHY

Some elements of study will be available on the course e-learning page (Moodle)

Alegre H. & Covas D. (2010). Gestão patrimonial de infra-estruturas de abastecimento de água. Uma abordagem centrada na reabilitação. Série Guias Técnicos 16. ERSAR, LNEC,IST. Lisboa.

Alegre H.; Hirner W.; Baptista J.; Parena R. (2004). Indicadores de desempenho para serviços de abastecimento de água. Série Guias Técnicos 1. ERSAR, LNEC. Lisboa.

Alegre H.; Coelho S.; Almeida M.; Vieira P. (2005). Controlo de perdas de água em sistemas públicos de adução e distribuição. Série Guias Técnicos 2. ERSAR, IA, LNEC. Lisboa.

Albuquerque Catarina (2014). No caminho Certo. Boas práticas na realização dos direitos à água e saneamento. Bettina Myers. Lisboa.

Manual de Saneamento Básico (MSB I) (1991), Tomo I - Abastecimento de Água e Esgotos, Direcção Geral dos Recursos Naturais, Lisboa.

Manual de Saneamento Básico (MSB II) (1991), Tomo II – Elementos Gerais, Direcção Geral dos Recursos Naturais, Lisboa

Year of implementation: 2016/2017 | Date of approval by the Technical-Scientific Board: