School of Agriculture
Course Unit Syllabus

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

Course Unit: **223523 – Wastewater and Rainwater Drainage Systems**

Year 2 **Semester 3** **ISCED Code: 712** **ECTS: 4.0**

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

COURSE COORDINATOR:

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	
100		**5**	**35**						**60**

Prerequisites (if applicable): Not applicable

LEARNING OUTCOMES (knowledge, skills and competence)

To identify the different types of drainage;

To identify the functionalities of maneuvering and safety devices used in drainage systems;

To apply techniques of repair, replacement and inspection of piping drainage systems;

To identify and perform operations of maintenance, funcioning and supervision of drainage systems for rainwater and wastewater;

To diagnose the anomalies and establish plans for improvement;

To Contribute to resource efficiency in the wastewater and rainwater sector

CONTENTS

1- Drainage of waste water and rainwater

Types of drainage systems: single, mixed and separative. Type of manifolds: pipes and fittings. Constitution of urban and land drainage systems. Classification, traces and symbology. Accessory elements of the network, and drainage on the roof of buildings. Notions of the return period. Notions of design flow, permeability coefficients: minimum flow; maximum flow rate; infiltration; flow sewage; pump stations; protection and control equipment

2- Operational procedures

Execution of excavations. Tests on pipelines

3- Rehabilitation support instruments, methodologies and techniques

Typical tasks for data collection

Performance evaluation system. Performance indicators.

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

In this course, the student is expected to know the drainage systems, the equipment, the operational procedures, the rehabilitation support techniques and the performance evaluation. Therefore, the program contents were selected with this objective in mind, addressing the theoretical and practices to identify the functionalities of the maneuvering organs in drainage systems, thus contributing to the development of competencies for resource efficiency in the wastewater and rainwater sector.

TEACHING METHODOLOGIES

Expositive, demonstrative and participatory methods

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

The methodologies used: The expository methodology to approach theoretical concepts. Participatory methodology requires interactive exposure with students; demonstration methodology with field trips (study visits), practical exercises and simultaneously the accomplishment of the group / individual work for the identification of accessory organs and interceptors of rainwater and wastewater collectors, thus, achieving the main objective of this couse that is to identify, diagnose and establish improvement plans that will contribute to resource efficiency in the wastewater and rainwater 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)

Almeida M C., Cardoso M.A. (2010). Gestão patrimonial de infra-estruturas de águas residuais e pluviais: Uma abordagem Centrada na reabilitação. Guias Técnicos 17. LNEC, ERSAR.

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

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