

## Course Unit: 15722 – Wastewater Quality Control

Year 2 Semester 4 ISCED Code: 712 ECTS: 6,0

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

COURSE COORDINATOR: Maria Adelaide Araújo Almeida

### 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	
150	30		45						75

Prerequisites (if applicable): Not applicable

### LEARNING OUTCOMES (knowledge, skills and competence)

Acquire basic knowledge about the concept of residual wastewater. Wastewater collection and sampling through a wastewater treatment plant. Transport of samples to the laboratory and how the results obtained in the quality control may be affected. Acquire knowledge enabling them to characterize a wastewater in the physicochemical parameters, according to the legislation. Have the ability to identify various sources of pollution and its impact on the wastewater quality of and some ways to minimize them. Knowing the analytical parameters necessary to reuse the wastewater for various purposes.

### CONTENTS

Wastewater. Origin and nature. Types of sampling, collection, storage and transport of samples to the laboratory. Pollution sources and their effects. Types of wastewater (domestic wastewater, industrial and hospital). Physical, chemical and microbiological parameters used to characterize one wastewater. National and community legislation relating to wastewater. Sensitive areas and less sensitive. Evaluation of quality of wastewater. Need of wastewater treatment in order to maintain the quality of the receiving medium. Some unit operations and processes involved in wastewater treatment: Operations physical, chemical and biological processes. Quality control to be carried out over the wastewater treatment systems with a view to disposal or reuse in various purposes.

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

Learning in this subject is primarily based on practice, ie the students, after a brief theoretical introduction, apply the acquired knowledge in practical exercises in the classroom and in realization of laboratorial works. This methodology allows the evaluation of learning objectives in the process, because the exercises and work require greater interaction between students and the teacher, allowing a constant evaluation by the teacher of knowledge acquired by students, allowing you to make the necessary adjustments for the methodology.

### TEACHING METHODOLOGIES

Expositive lectures, practical classes, laboratorial classes, guided study.

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

Expositive lectures (using audiovisual media), problem solving, literature research. Laboratory classes to determine the parameters necessary to perform quality control of wastewater.

### EVALUATION METHODS

The students should be prepared group reports from laboratory work classes that count, after discussion with 20% of the final

average Evaluation: a final exam where the student must be at least 8.5 will be held.

## MAIN BIBLIOGRAPHY

Alguns elementos de estudo serão disponibilizados na página de elearning da UC (Moodle)

APHA (2013) Standard Methods for the Examination of Water and Wastewater, 22st Edition, Washington.

Decreto-lei nº 152/97, de 19 de Junho. Diário da República nº 139 - I Série-A. Ministério do Ambiente. Lisboa.

Decreto-lei nº 236/98, de 1 de Agosto. Diário da República nº 176 - I Série- A. Ministério do Ambiente. Lisboa.

Mendes, B. e Oliveira, J., F., (2006). Qualidade da água para consumo Humano. Lidel.

Metcalf , & Eddy (2004). Waste Water Engineering: Treatment, Disposal and Reuse (3 ed.). MacGraw-Hill., New York.

Degrémont (1999). Water Treatment Handbook. 2 vols, (6 ed.). Lavoisier Publishing. Paris.

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