

Course Unit	Environmental Quality Control Laboratory	Field of study	Environmental Technology
Bachelor in	Chemical Engineering	School	School of Technology and Management
Academic Year	2023/2024	Year of study	3
Type	Semestral	Semester	1
Level	1-3	ECTS credits	6.0
Code	9125-755-3102-00-23		
Workload (hours)	162	Contact hours	T 15 TP - PL 45 TC - S - E - OT - O -

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) **Ramiro José Espinheira Martins**

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Characterize rigorously different water types in the area of the quality control: superficial, potable, waste and recreation.
2. Recognize and understand the importance of the water quality parameters, for different types of waters, in the design and conception of environmental and recreation plants.

Prerequisites

Before the course unit the learner is expected to be able to:
None.

Course contents

Experimental measure and critical analysis of the results obtained to the water characterization (potable, superficial, waste, recreation): solids, conductivity, turbidity, nitrates, nitrites, nitrogen, hardness, alkalinity, sulphates, phosphorous, residual chlorine, chemical and biochemical oxygen demand.

Course contents (extended version)

1. To acquire theoretical and technical knowledge of the main parameters to the water characterization:
2. Determine TSS, VSS, TDS, Electric Conductivity, Turbidity and Settleable Solids of water sample.
3. Determine Nitrates, Nitrites in samples of superficial water and domestic wastewater.
4. Determine the Ammoniacal Nitrogen in superficial and wastewater samples.
5. Determine the Total and Phenolphthalein Alkalinity.
6. Determine the Sulfates concentration in water sample by Turbidimetric and Spectrofotometric methods.
7. Determine the Biochemical Oxygen Demand (BOD) in sample DW previously decanted.
8. Determine the Chemical Oxygen Demand (COD) in sample DW by Closed Reflux Method (Titrimetric).
9. Determine Soluble and total Phosphorous in one superficial water sample - Ascorbic Acid Method.
10. Determine the Residual Chlorine Free and Total in tap water and swimming pool samples – DPD Method.
11. Determine the Apparent and True Colors of water sample.
12. Determine the Hardness (Total and Permanent) of one water sample.

Recommended reading

1. Standard Methods for the Examination of Water and Wastewater, 24th Edition, Washington DC, 2023. Published by APHA, AWWA, WEF.
2. J. Rodier, L'analyse De L'eau : Eaux Naturelles, Eaux Résiduares, Eau De Mer, 7e éditions, Ounod, Paris, 1984.
3. Diário da República, Decreto-lei 236/1998 de 1 de Agosto de 1998. Diário da República, Decreto-lei 306/2007 de 27 de Agosto de 2007.
4. D.R. DL nº69/2023 de 21 de agosto 2023. Regime jurídico da qualidade da água destinada ao consumo humano.

Teaching and learning methods

Laboratory Practical Classes: Acquisition of essential theoretical knowledge in a non-face-to-face context; practical execution of planned tasks, with guidance and clarification of doubts. Instill in students the need for precision in experimental execution and critical analysis of the obtained results.

Assessment methods

- Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
 - Laboratory Work - 45% (The student has to carry out, necessarily, at least 75% of the experimental works and reports.)
 - Projects - 10% (Practical work video production of one laboratory experiment.)
 - Final Written Exam - 45% (A minimum score of 7 is required.)

Language of instruction

English

Electronic validation

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02-11-2023	02-11-2023	04-11-2023