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|------------------|------------------------------------|----------------|---------------------------------------|
| Course Unit      | Environmental Quality Laboratory I | Field of study | Environmental Protection Technologies |
| Master in        | Environmental Technology           | School         | School of Agriculture                 |
| Academic Year    | 2023/2024                          | Year of study  | 1                                     |
| Type             | Semestral                          | Semester       | 1                                     |
| Workload (hours) | 162                                | Contact hours  | T - TP - PL - TC - S - E - OT - O -   |
|                  |                                    | Level          | 2-1                                   |
|                  |                                    | ECTS credits   | 6.0                                   |
|                  |                                    | Code           | 1076-809-1103-00-23                   |

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) Ermelinda Lopes Pereira, Luís Avelino Guimarães Dias

#### Learning outcomes and competences

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

1. Know the various types of water and current legislation
2. Know the methods of sampling and preservation of samples for physico-chemical and microbiological analysis.
3. Know the main physical-chemical, microbiological and biological parameters to the water characterization and their determination

#### Prerequisites

Before the course unit the learner is expected to be able to:  
Have basic knowledge of chemistry and microbiology

#### Course contents

Physical-chemical analysis of water; Microbiological analysis of water; Biomonitoring of water quality. Legislation

#### Course contents (extended version)

1. Part A
  - Basic Concepts: Solution concentrations; Unities
  - Solutions: Preparation. Standardization
  - Sampling: Sampling points; Sampling techniques; Sampling frequency and Samples preservation
  - Analysis: Physical-Chemical parameters
2. Part B
  - Assessment of the status of surface water bodies based on the Water Framework Directive.
  - Biological hazards in water; Reference pathogens and emerging microorganisms in water environment.
  - Microbial monitoring; Sampling. Indicator organisms. Methods of detection of indicator organisms.
  - Bacteriological analysis: Count of heterotrophic, coliforms, E. coli, . . .
  - Virological analysis: Methods for the detection of Enteroviruses and bacteriophages in water samples
  - Protozoa: Characteristics; Cryptosporidium/Giardia detection methods in water samples
  - Legislation applied for different types of water

#### Recommended reading

1. Standard Methods for the Examination of Water and Wastewater; 16ª edition; APHA, AWWA, WPCF; Washington, 2005
2. WHO (2017). Guidelines for drinking-water quality: fourth edition incorporating the first addendum ISBN 978-92-4-154995-0
3. Normas ISO (6222; 9308-1; 9308-2; 6461/2; ; 7899-2; 17043)
4. Vogel, Jeffery, Basset, Mendham, Denney - Análise Química Quantitativa, 4ª e 5ª edições, Editora Guanabara Koogan S. A. , Rio de Janeiro,
5. Guidelines for drinking-water quality: 4th edition incorporating the 1st addendum. World Health Organization, 2017

#### Teaching and learning methods

Explanation of the theoretical subjects in theoretical and/or practical/ theoretical lectures, and their application in proposed laboratory work and carried out by students. Bibliographic check.

#### Assessment methods

1. Assessment 1 - (Regular) (Final)
  - Intermediate Written Test - 35% (Part A - Assessment of theoretical and practical contents.)
  - Laboratory Work - 15% (Part A - Evaluation of laboratory work reports.)
  - Intermediate Written Test - 35% (Part B - Assessment of theoretical and practical contents.)
  - Laboratory Work - 15% (Part B - Evaluation of laboratory work reports.)
2. Assessment 2 - (Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 100% (Part A + Part B - Assessment of theoretical and practical contents.)

#### Language of instruction

Portuguese

#### Electronic validation

|  |                              |                                 |                                 |
|--|------------------------------|---------------------------------|---------------------------------|
| Ermelinda Lopes Pereira, Luís Avelino Guimarães Dias | Amílcar Manuel Lopes António | Manuel Joaquim Sabeça Feliciano | Maria Sameiro Ferreira Patrício |
| 01-02-2024   | 01-02-2024                   | 01-02-2024                      | 01-02-2024                      |