School of Agriculture
Course Unit Syllabus

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

Course Unit: **223503** – **Laboratorial Environmental Techniques**

Year 1 **Semester 1** **ISCED Code: 712** **ECTS: 4.0**

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

COURSE COORDINATOR: António Carloto

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		**15**	**45**						**40**

Prerequisites (if applicable): Not applicable

LEARNING OUTCOMES (knowledge, skills and competence)

The training unit seeks to reflect the technological level of education in which it is located and seeks students to achieve, among others, the following objectives:

(a) Acquire fundamental knowledge that allows the evaluation of analytical data and the statistical treatment of the experimental data.

b) Know the basic fundamentals of the physicochemical techniques used in the evaluation of the various environmental parameters.

c) Apply and execute the various physicochemical techniques autonomously and solve technical problems of intermediate complexity.

d) Know the fundamentals and apply the basic techniques used in environmental microbiology.

CONTENTS

1 - Definition of environmental analyses: physicochemical analysis and biological analysis; importance of chemical analysis in environmental engineering; importance of biological analysis.

2 - Evaluation of analytical data: types of errors; origin of errors; statistical treatment of experimental data.

3 - Sampling: sample volume; representativeness of the samples; identification of samples; transport and preservation of samples.

4 - Methods of quantitative chemical analysis: volumetry; neutralization, precipitation, complexation and oxidation-reduction reactions; gravimetry.

5 - Instrumental methods: optical methods; colorimetry and spectrophotometry; atomic absorption spectroscopy; chromatography, potentiometry.

6-Introduction to Microbiology; microbiological control of microorganisms.

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

a) 1,2.

b) 3,4.

c) 4,5.

d) 6.

TEACHING METHODOLOGIES

As an mainly practical and laboratorial training course, the theoretical, expository classes will serve to frame students in the theoretical principles of the techniques that they are going to perform in the laboratory.

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

It stems from the name of the training unit and the objectives of the above-mentioned learning, that the emphasis is placed on laboratory practice classes in the physicochemical and microbiology laboratories, where students will have contact with a big diversity of techniques, materials and equipment that they may find later in professional activity.

EVALUATION METHODS

The evaluation will have a practical component, worth 50% of the final grade, of a continuous nature, based on the commitment and proficiency demonstrated in the laboratory practice classes. There will also be a theoretical-practical evaluation component, 50% of the final grade, based on a written test. This test may be repeated if the student reproves or wants to raise the note, at the normal time of evaluation and/or at the time of appeal.

MAIN BIBLIOGRAPHY

In addition to the elements available on the UC e-learning page (moodle):

Ewing, G.W. (1985). Instrumental Methods of Chemical Analysis. 5th Edition. McGraw- Hill International Edition.

Ferreira, W.F.C.; Sousa, J.C.F. & Lima, N. (editors), (2010), Microbiology. Lidel, Technical editions. Lisbon, Oporto.

Gonçalves, M.L.S. (2001). Instrumental methods for analysis of solutions-quantitative analysis. 2nd edition. Calouste Gulbenkian Foundation. Lisbon.

Pombeiro, A. J. L. O. (2003). Techniques and operations. Unit in laboratory chemistry. 6th edition. Calouste Gulbenkian Foundation. Lisbon.

Skoog, D.A., West, D. M., Holler, F. J., Crouch, R. S. (2004). Fundamentals of Analytical Chemistry, 9 th Edition. Saunders College Publishing. Philadelphia.

Skoog, D.A., Holler, F. J., Crouch, R. S. (2006). Principles of Instrumental Analysis. 6th Edition. Saunders College Publishing.

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