

POLI ESCOLA SUPERIOR TECNOLOGIA GESTÃO TÉCNICO GUARDA	SUBJECT DESCRIPTION	MODELO PED.013.03
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Course	Energy and Environment					
Subject	Laboratory Techniques in Environment					
Academic year	2023/2024	Curricular year	2nd	Study period	2nd semester	
Type of subject	Compulsory	Student workload (H)	Total: 140	Contact: 67.5	ECTS	5.0
Professor(s)	Pedro Miguel dos Santos Melo Rodrigues					
<input checked="" type="checkbox"/> Area/Group Coordinator <input type="checkbox"/> Head of Department	(select)	Rui António Pitarma S. Cunha Ferreira				

PLANNED SUBJECT DESCRIPTION

1. LEARNING OBJECTIVES

Acquisition of knowledge that allow the evaluation of analytical data and the respective statistical treatment of the experimental data. Properly proceed with the elaboration and execution of sampling procedures. Know the fundamentals of the functioning, and applicability, of the analytical techniques used in the evaluation of the various environmental components. Special emphasis is given to the laboratory component, where tests are carried out to control the quality and pollution of water, air, and soil.

2. PROGRAMME

- [1] Definition of Environmental Analysis: Physicochemical and biological analysis; Importance of chemical and biological analyzes in the study of the environment.
- [2] Evaluation of analytical data: Types of errors; Origin of errors; Statistical treatment of experimental data.
- [3] Sampling: Sample volume; Representativeness of samples; Identification of samples; Transport and storage of samples.
- [4] Quantitative Chemical Analysis Methods: Volumetry; Neutralization; Precipitation; Complexation; Oxidation-reduction reactions; Gravity.
- [5] Instrumental Methods: Spectroscopic, chromatographic and potentiometric methods.
- [6] Biological Tests: Tests with bacteria, algae; Daphnia; fish and seeds.
- [7] Analysis of chemical species in environmental samples.

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

The syllabus is consistent with the objectives of the course:

1. Know and put into practice the methods of statistical treatment of analytical data;
2. Plan and carry out procedures for collecting environmental samples;
3. Perform and collaborate in the development of analytical methods as well as their laboratory execution and interpret the meaning of the analytical results;
4. Develop communication skills, critical thinking and autonomous learning;
5. Develop the ability to work collaboratively.

4. MAIN BIBLIOGRAPHY

Harvey D.; Analytical Chemistry 2.1, Electronic Version, 2016;

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*Skoog D. A., West D. M., Holler F.J., Crouch S. R.; Fundamentals of Analytical Chemistry 9th edition, Cengage Learning, 2013;
C.N. Sawyer, P.L. McCarty G.F. Parkin; Chemistry for Environmental Engineering and Science--fifth edition, Mc Graw Hill, 2017;
Francis Rouessac and Annick Rouessac; Chemical Analysis, 2º ed, John Wiley & Sons, England, 2007;
F.W. Fifield and P.J. Haines; Environmental Analytical Chemistry, 2º ed., Blackwell Science, USA, 2000.*

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

The lectures involve the exposing of the programmatic content with PowerPoint slides. In the practical classes, exercises will be solved. In laboratory classes, students will be divided in groups to carry out the proposed tests. The assessment was carried out through practical work (40%) and frequency (60%), exam and/or appeal exam. The student must obtain a grade equal or higher than 10/20.

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

The expository methodology associated with the resolution of theoretical-practical exercises and the carrying out of laboratory classes, will allow the student to:

- 1. Put into practice the methods of statistical treatment of analytical data;*
- 2. Develop environmental sampling campaigns taking into account best practices;*
- 3. Develop and implement analytical methods as well as their laboratory execution and interpret the analytical results obtained;*
- 4. Develop communication skills, critical thinking and autonomous learning;*
- 5. Develop the ability to work collaboratively.*

7. ATTENDANCE

This course has only optional attendance, therefore, attendance at classes is optional.

8. CONTACTS AND OFFICE HOURS

Office: Laboratory (Labmia); Email: prodriques@ipg.pt; Opening hours: Monday (11:30 - 12:30); Thursday (11:30 - 12:30); Thursday (14:00 - 15:30)

DATE

29 February 2024

SIGNATURES

Professor

(signature)

Area/Group Coordinator

(signature)

<p>POLI</p> <p>ESCOLA SUPERIOR TECNOLOGIA GESTÃO</p> <p>TÉCNICO GUARDA</p>	<p>SUBJECT DESCRIPTION</p>	<p>MODELO</p> <p>PED.013.03</p>
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