

25238 - Analytical technology for the detection of contaminants

Syllabus Information

Academic year: 2023/24

Subject: 25238 - Analytical technology for the detection of contaminants

Faculty / School: 201 - Escuela Politécnica Superior

Degree: 571 - Degree in Environmental Sciences

ECTS: 6.0

Year:

Semester: Second Four-month period

Subject type: Optional

Module:

1. General information

The main objective of this subject is to acquire the knowledge and skills necessary to design, optimize and develop a method of analysis based on instrumental techniques for the analysis of contaminants at trace levels in environmental samples.

It also aims to deepen theoretical and practical aspects of sample treatment, as well as the complete analysis of environmental samples and interpretation of the results.

These approaches and objectives are aligned with the Sustainable Development Goals (12 and 13) of the 2030 agenda, specifically Objectives 12.4 and 13.3 (<https://www.un.org/sustainabledevelopment/es/>)

2. Learning results

. Perform literature searches related to the analysis of contaminants in environmental samples, covering sample collection and selection of the most appropriate analytical method.

. To critically analyse the results obtained from the experimental work and to draw correct conclusions from the point of view of instrumental analysis in the environment. . The student will be able to propose future modifications and improvements to the experimental work carried out.

. Plan the experimental work that is necessary to respond to the environmental problem posed. In order to achieve this, the student is able to know the nature of environmental samples, plan and carry out sampling, and apply the most appropriate analytical process.

. Handle specific and advanced equipment and instrumentation of an environmental chemical analysis laboratory.

. Write reports of the experimental work carried out and correctly explain the details and results obtained, with a critical reasoning on its meaning and repercussion,.

. Know the danger of the reagents used in laboratory practices and therefore, the environmental risks derived from their use.

3. Syllabus

Topic 1. Bibliographic search of analytical methods.

Topic 2. Planning the analysis of environmental samples for the detection and determination of contaminants. Quality criteria of analytical methods. Calibration methods.

Topic 3. Determination of metals in environmental samples. Sample extraction and decomposition techniques.

Advanced Spectroscopy Techniques. Practical classes.

Topic 4. Determination of organic contaminants in environmental matrices. Advanced extraction techniques.

Chromatographic techniques (chromatographic separation optimization, detectors). Practical classes.

4. Academic activities

Theory classes (25h). The theoretical contents of the subject and the planning of the practices will be explained.

Problem classes (5h). Problems related to the practices will be solved.

Practical classes (30h). Laboratory practices will be carried out in 4 thematic blocks (characterization of natural waters and wastewater, determination of metals in sludge and/or wastes, separation and determination of organic compounds in soils). The student will put into practice the theoretical knowledge acquired on analytical methodologies and numerical calculations.

5. Assessment system

The evaluation system is global and consists of two tests:

Test 1. Written exam (50% of the grade, minimum 5 out of 10). Theoretical and practical questions and problem solving.

Evaluation criteria: mastery of the contents, adequacy of the answers, clarity in the written presentation, ability to interrelate the concepts, interpretation of analytical results and reasoning in the resolution of problems.

Test 2. Presentation of results and/or reports of the different blocks of practices (50% of the grade, minimum 4.5 out of 10). It is advisable to present them throughout the semester.

Evaluation criteria for the report: presentation, understanding of the methods and techniques used, accuracy of the results obtained and discussion of the same as well as mastery of the risk and danger of the chemical reagents used. Active participation and interest of the student in the work developed in the laboratory will be positively valued.

The detailed definition of the evaluation system will be explained in the presentation of the subject

Success rates for the last 3 academic years are:

2019/20	2020/21	2021/22
100%	No teaching	100%