

25255 - Chemical analysis in the environment

Syllabus Information

Academic year: 2023/24

Subject: 25255 - Chemical analysis in the environment

Faculty / School: 201 - Escuela Politécnica Superior

Degree: 571 - Degree in Environmental Sciences

ECTS: 6.0

Year: 2

Semester: Second Four-month period

Subject type: Compulsory

Module:

1. General information

The main objective of this subject is to give a vision of the chemical analysis methods that can be developed and applied in an environmental laboratory. A global vision of Analytical Chemistry as a science that generates information for the resolution of environmental problems should be acquired. This implies knowing the analytical techniques and procedures involved in the determination of the most relevant chemical species in the various media of environmental interest (air, water, soil).

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/>)

Recommendation: to have taken the subject Chemical Basis of the Environment.

2. Learning results

- . Differentiate and describe the different steps of a general analytical process, as well as the methods to carry them out (sampling techniques, sample treatment methods, calibration methods).
- . Describe volumetric analysis and the main instrumental analysis techniques, explain their theoretical basis and their environmental applications.
- . Solve numerical problems on quantitative analysis and interpret both qualitative and quantitative analytical data.
- . Handle the basic equipment and instrumentation of an environmental analysis laboratory to carry out the application of an analytical method.
- . To know the hazardous nature of the reagents used in laboratory practices and, therefore, the environmental risks derived from their use

3. Syllabus

Topic 1- Introduction to environmental chemical analysis. Stages of the analytical process. Evaluation of analytical data.

Topic 2- Sampling techniques and preservation of samples.

Topic 3. Chemical treatment of the sample. Sample extraction and decomposition methods.

Topic 4. Volumetric analysis: methods and calculations.

Topic 5. Quantification in instrumental analysis. Calibration.

Topic 6- Introduction to Spectroscopic Techniques

Topic 7- Molecular Absorption Spectroscopy

Topic 8- Atomic Spectroscopy

Topic 9- Introduction to Chromatographic Techniques

Topic 10- Gas Chromatography

Topic 11- Liquid Chromatography

4. Academic activities

Master classes (25h). The theoretical contents of the subject will be explained.

Problem classes (5h). Volumetric and instrumental analysis problems will be solved.

Practical classes (30h). Laboratory practices (2h per session) will be carried out on the determination of different chemical species in environmental samples. The student will put into practice the theoretical knowledge acquired on the analytical methodologies (volumetric and instrumental analysis) and numerical calculations.

Tutoring. Students are encouraged to attend tutorials to resolve any doubts.

Non-face-to-face activities. It involves reading and understanding the theoretical knowledge material, preparing the practical

sessions and solving the proposed problems.

5. Assessment system

The evaluation system is global and consists of two tests:

Test 1. Written test of theory and problems (70% of the grade, minimum 5 out of 10). Evaluation criteria: mastery of the contents, ability to interrelate concepts, knowledge of the fundamentals of analytical techniques, interpretation of analytical results and reasoning in the resolution of problems.

Test 2. Practical exam (30% of the grade, minimum 4.5 out of 10). The student will be able to opt for:

- two written tests (multiple-choice exam) to be taken at the end of each of the practical blocks (volumetric and instrumental) on dates set at the beginning of the semester

- a laboratory test that will consist of a previous questionnaire and that, if the result is acceptable, will give rise to the realization of one of the practices of the program of the subject. This test will be held on the official date of each call.

Practical evaluation criteria: knowledge of analytical procedures and chemical analysis laboratory work protocols, mastering the use of materials and instrumentation, accuracy and precision of results and risk of chemical reagents.

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
65,9%	50,0%	69,2%