

27226 - Environmental and Toxic Analysis

Syllabus Information

Academic year: 2023/24

Subject: 27226 - Environmental and Toxic Analysis

Faculty / School: 100 - Facultad de Ciencias

Degree: 452 - Degree in Chemistry

ECTS: 5.0

Year: 4

Semester: Second semester

Subject type: Optional

Module:

1. General information

The objective of this subject is to train the student in a global vision of the analytical problems derived from the presence of pollutants in the environment, providing the ability to reason what is the most appropriate analytical strategy for the determination of the same by means of a theoretical and experimental methodology appropriate to the defined analytical problem. To this end, the specific objectives are:

- To know the main pollutants, types, characteristics and processes of bioavailability, mobility, and toxicity.
- To know in general terms the basic legal regulations on environmental analytical control.
- To know the application methodologies of analytical techniques, their fundamentals, specific characteristics in this field and environmental applications (coupled techniques, automatic networks and in situ analyzers)

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs): 3, 4, 5, 6, 7, 7, 12, 14 and 15.

2. Learning results

- Knows the main types of analytical parameters that are determined in environmental samples and their significance to interpret contamination processes.
- Handles the terminology and usual concepts in environmental analysis. Adequately consults the legislation regarding environmental control.
- Correctly applies the legal regulations in force that regulate the determination of some frequent parameters in the analysis of environmental samples.
- Knows the sampling techniques and the importance of sampling in the analytical result.
- Knows the particularities of the analytical methodology to successfully address the determination of chemical substances in environmental samples
- Designs and develops correctly the analytical methods object of the subject, in terms of study planning, sampling, pretreatment, determination of the analytical signal, validation and interpretation of results.
- Designs strategies to face a real analytical problem that involves the application of the methods studied in the subject.
- Presents and evaluates the results obtained in the analysis of a sample.
- Develops interpretation reports of the results obtained in the context of the analyzed sample.

3. Syllabus

1. Types and general characteristics of pollutants: water, soils and sediments, air, waste,
2. Origin, mobility, transport, bioavailability, accumulation and toxicity of contaminants.
3. General environmental legislation. Reports.
4. Sampling methods for environmental analysis.
5. Techniques and methodologies in the analytical control of inorganic contaminants. Functional and chemical speciation.
6. Techniques and methodologies in the analytical control of organic contaminants.
7. Applications in the analysis of the hydrosphere, soils, sediments, wastes, and living beings, gaseous pollutants, particulate matter and volatile organic compounds.
8. In situ techniques and methodologies: sensors. Automatic networks. Screening techniques.
9. Introduction to the analytical control of emerging contaminants.

4. Academic activities

THEORY, EXERCISES AND SEMINARS. 4 ECTS

- **THEORY.** Presentation of contents in class by the teacher, and discussion of the same. Proposal and resolution of practical cases. Comments and class discussions on current news related to the environmental pollution control
- **EXERCISES AND ACTIVITIES.** Exercises related to the theory to be done throughout the semester.
- **SEMINARS.** Presentation of results of in-class activities by students, and discussion of the same.

EXTERNAL VISITS. A visit will be made to public environmental control laboratories.

PRACTICES. 1 ECTS (10 hours of practices)

5. Assessment system

Continuous evaluation:

Theoretical-practical written tests (50% of the grade): There will be several tests throughout the semester, and they will contain theory questions and theoretical-practical questions.

Completion of exercises and activities(20% of the grade): They will be carried out during the semester and their correct development will be evaluated.

Laboratory practices (20 % of the grade): In order to obtain the final grade for the practices, the following will be evaluated:
Attitude in the laboratory

Report of results

Group work(10% of the grade): Presentation and discussion in class on a practical case of environmental control.

In order to be able to average all the parts it will be necessary to achieve in the theoretical-practical written test as well as in the realization of exercises and activities and in the laboratory practices a minimum grade of 4.5 out of 10.

Global evaluation:

In the event that a student enrolled in this subject does not take the continuous evaluation, in whole or in part, or wants to take it to improve the grade, they can take the theoretical and practical tests in the global evaluation periods of the subject that will allow them to obtain 100% of the grade.