Universidad Zaragoza

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Información del Plan Docente

Academic Year	2017/18
Faculty / School	201 - Escuela Politécnica Superior
Degree	571 - Degree in Environmental Sciences
ECTS	6.0
Year	2
Semester	Four-month period
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The learning process that is designed for this subject is based on the following:

Since the subject is theoretical / practical, the proposed methodology includes classroom lectures complemented by sessions of laboratory practices, where the student will apply the basic knowledge about the main tools of chemical analysis applied to environmental samples . The lectures are reinforced with solving sessions of various types of problems or numerical exercises.

It will place special emphasis to better monitoring of the learning process on the need to attend classes of theory / problems since to develop practical laboratory activities, it is essential that students acquire and understand the theoretical foundations and calculations They will be held during the laboratory sessions.

All necessary documentation to track the subject will be available on the Moodle platform.

5.2.Learning tasks

The program that the student is offered to help you achieve the expected results includes the following activities.

Theory classes (25 hours) that consist of lectures aimed at students to acquire theoretical knowledge and basic principles of Instrumental Analysis in the environment. Classes will be held interactively with students, discussing with them the aspects that are more difficult or especially interesting for each topic. "Case studies" that allow students to consolidate the theoretical concepts and establish the applicability of chemical analysis in solving environmental problems will be presented.

Problem classes (5 hours) which will be inserted in the calendar as progress is made in the content of the subject to be seeing in the theoretical classes. analytical numerical problems and environmental problems related to sampling, sample treatment, etc., to be solved by the students: two types of problems will arise. Class will resolve some of the problems raised type, the rest of the student must solve the non-contact hours.

Laboratory practice sessions (30 h). According to academic calendar 15 sessions of two hours each will be made. various practices on determination of pollutants in real samples that favor the consolidation of theoretical knowledge will be developed. Depending on the number of students and depending on the type of practice, it will work in pairs or in groups of 4-5 students. Each student must have its own laboratory notebook and also must go to the laboratory with the script of practices studied and resolved some preliminary questions. all practice sessions attendance is recommended. At the end of each session, students will present the results for the teacher to deliver it fixed in the next practice session

Tutorials . Attendance at tutorials to clarify any doubts of more individualized students is recommended. In them, the teacher can do a better closer monitoring of student work orientating the most appropriate methods.

Non-contact activities . They consist of reading and understanding the material of theoretical knowledge and resolution of exercises during sessions of theory and practice. These activities will be conducted with full freedom time.

5.3.Syllabus

Theory

MODULE 1. INTRODUCTION TO ENVIRONMENTAL ANALYTICAL CHEMISTRY General Concepts of analytical chemistry. Stages of the analytical process. Introduction to Volumetric Analysis. Problems.

MODULE 2. SAMPLE TAKING AND SAMPLE TREATMENT

Methods and techniques of water, soil and air sampling. Methods of extraction and break down. MODULE 3. QUANTIFICATION AND TREATING DATA

Calibration. Evaluating results. Errors in analytical chemistry. Problems. MODULE 4- OPTICAL METHODS OF ANALYSIS

Introduction to Spectroscopic techniques. Molecular Spectroscopy UV-VIS. Atomic Spectroscopic

MODULE 5- CHROMATOGRAPHIC METHODS

Introduction to Instrumental Chromatography. Gas Chromatography. Liquid Chromatography. METHODS 6-

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ELECTROCHEMISTRY

Potentiometric Techniques. Ion-Selective Electrodes

PROGRAM OF LABORATORY PRACTICALS

Practice 1. Presentation and introduction to work in a laboratory of Analytical Chemical

Practice 2-4. Determination of *physicochemical parameters in drinking water* Determining the alkalinity, chloride, hardness and conductivity

- Applying acid base volumetrics, of precipitations and complexometrics

Practice 5. Determining organic matter in soils

- Applying Redox titration

Practice 6. Determining nitrates in samples of drinking water

- Applying Spectrometry of Molecular Absorption in the UV Practice 7.-Determining phosphorous in urban sewage

- Applying Spectrometry of Molecular Absorption in the Visible Range

Practice 8-9. Determinación de metales en lodos de depuradora

- Optimizing the method of acid digestion

- Applying Spectrometry of Atomic Absorption

Practice 10-12. Determining pesticides present in water samples

- Extracting with organic solvents

- Applying Gas Chromatography

Practice 13. Separating polar organic compounds using HPLC

5.4.Course planning and calendar

The subject consists of 30 contact hours of lectures and 30 contact hours dedicated to practical work in the laboratory that will be held regularly during the 15-week semester (2 hours theory and 2 hours of practice / week).

5.5.Bibliography and recommended resources

BB	Harris, Daniel C.. Análisis químico cuantitativo / Daniel C. Harris . 2a ed. Barcelona [etc] : Reverté, D.L. 2001
BB	Skoog, Douglas A.. Química analítica / Douglas A. Skoog...[et al.] ; traducción María del Carmen Ramírez Medeles ; revisión técnica Luz Beatriz Santos Aquino . 7a. ed. México [etc.] : McGraw-Hill, cop. 2000
BC	Aguas / PANREAC . Barcelona [etc.] : Montplet & Esteban, 1983
BC	Análisis químico de aguas residuales / Jesús Beltrán de Heredia Alonso ... [et al.] [Badajoz] : Universidad de Extremadura, Instituto de Ciencias de la Educación : Abecedario, 2004
BC	Faithfull, Nigel T.. Métodos [de] análisis químico agrícola : manual práctico / Nigel T. Faithfull ; traducción de Ana Cristina Ferrando Navarro ; revisión de Miguel Ángel Usón Finkenzeller . Zaragoza : Acribia, 2005
BC	Jackson, M.L.. Análisis químico de suelos / M.L. Jackson ; traducido del inglés americano por José Beltrán Martínez . [4a. ed.] Barcelona : Omega, 1982
BC	Marr, Iain L.. Química analítica del medio ambiente / Iain L. Marr, Malcolm S. Cresser, José L. Gómez Ariza ; [versión española, José Luis Gómez Ariza] Sevilla : Universidad, D.L. 1989
BC	Métodos normalizados : para el análisis de aguas potables y residuales / preparado y publicado conjuntamente por American Public Health Association, American Water Works Association, Water Pollution control Federation ; directora de edición Mary Ann H. Franson . Madrid : Díaz de Santos, D.L. 1992
BC	Métodos oficiales de análisis / [publicados por el] Ministerio de Agricultura, Pesca y Alimentación, Dirección General de Política Alimentaria . Madrid : Secretaría General Técnica, Ministerio de Agricultura, Pesca y Alimentación, 1993-1994
BC	Warner, Peter O.. Análisis de los contaminantes del aire / Peter O. Warner ; [traducido por E. Cadenas] Madrid : Paraninfo, 1981

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The updated recommended bibliography can be consulted in:
http://psfunizar7.unizar.es/br13/egAsignaturas.php?id=10998