30805 - Key techniques for chemical analysis

Información del Plan Docente

Academic Year	2016/17
Academic center	105 - Facultad de Veterinaria
Degree	568 - Degree in Food Science and Technology
ECTS	6.0
Course	1
Period	Second semester
Subject Type	Basic Education
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process that is designed for this subject is based on ...

- **40 hours of lectures:** the contents of each issue are discussed alternating theory with examples, issues and problems.
- **5 hours of workshops:** are 5 sessions of 1 hour. The group is divided into 2 subgroups. Problems, doubts and applied exercises will be solved.
- **15 hours of laboratory practice:** 15 hours of laboratory practice: the practice group is divided into 5 teams. There are 5 different practices of 3 hours.
- **8 hours of supervisal practical group.** Prepare and present a practice to the rest of the group.

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5.2.Learning activities

The course is divided into 6 blocks. The activities are...

Block I

Teaching-learning activities: (0,8 ECTS)

Lectures: 7 hours

Workshop: 1 hour

Student work: 11 hours of study and 1 hour to solve a self-evaluative test.

Block II

Teaching-learning activities: (0,5 ECTS)

Lectures: 4 hours

Workshop: 1 hour

Student work: 6,5 hours.

Block III

Teaching-learning activities: (0,9 ECTS)

Lectures: 8 hours

Workshop: 1 hour

Student work: 12,5 hours of study and 20 minutes to solve a self-evaluative test

Block IV

Teaching-learning activities: (1,4 ECTS)

Lectures: 13 hours

Workshop: 1 hour

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Student work: 20 hours of study and 20 mintes to solve a self-evaluative test,

Block IV

Teaching-learning activities: (1,5 ECTS)

Practice: 15 hours

Student work: 7,5 hours of study and 8 hours of supervised work

5.3.Program

BLOCK I. Introduction.

Unit 1. Objectives of the Analytical Chemistry.

Analytical process. Analytical signals. Calibration. Calibration line. Sensitivity. Linear response range. Detection limit. Noise

BLOCK II. Electroanalytical techniques.

Unit 2. Potentiometry.

Introduction to electroanalytical techniques. Classification. Potentiometry. Instrumentation. Electrodes. Applications. Potentiometric titrations.

BLOCK III. Chromatographic techniques.

Unit 3. Introduction to chromatography.

Classification. Column chromatography. Analytical signal: the chromatogram. Parameters: a.- dead time (tm) b.- retention time (tr) c.- capacity factor. d.- selectivity factor. e. chromatographic peak width. Efficiency. f. Resolution. Optimization techniques. The general problem of elution. The chromatograph. Qualitative and quantitative information. Calibration: Internal standard.

Unit 4. Gas chromatography. GC principles. The chromatograph. Columns. Injector. Carrier gas. Injection modes. Detector. Oven. Applications. Methodology

Unit 5. High performance liquid chromatography. Pumps. Sample injection systems. Chromatographic columns. Detectors. Separation modes. Applications.

BLOCK IV. Molecular spectrometric techniques.

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Unit 6. Introduction to optical analysis techniques.

Structure of matter. Energy electromagnetic radiation. Interactions. Classification. Analytical signal. Spectra. Information.

Unit 7. Molecular absorption spectrometry in the UV-Visible.

Parameters and information. Lambert-Beer law. Molecules. Instrumentation. Applications. Quantitative aspects. Deviations from the Beer-Lambert law. Methodology. Other applications: qualitative and photometric ratings.

Unit 8. Molecular Luminescence. Photoluminescence: fluorescence and phosphorescence. Fluorescent process. Parameters and information. Fluorescent molecules. Instrumentation. Relationship between intensity and concentration. Applications.

Unit 9. Molecular absorption spectrometry in the infrared. Introduction. Parameters and Information. IR spectrum. Instrumentation. Applications

BLOCK V. Atomic spectrometric techniques.

Unit 10. Spectrometry flame atomic absorption

Introduction. Parameter measurement. Information. Instrumentation. Radiation sources. Sample compartment: flame. Types of instruments. Applications. Quantitative aspects. Absorbance-concentration relationship. Interferences. Work Methodology Applications

Unit 11. Atomic emission spectrometry flame

Emission spectra flame photometry. Instrumentation. Quantitative applications. Intensity and concentration ratio. Interferences. Analytical methodology. Applications.

BLOCK VI. Laboratory practices

Practice 1 Molecular absorption spectrometry UV-Visible. Determination of phosphate in a cola drink. Choosing conditions.

Practice 2 Atomic Absorption Spectrometry. Determination of copper in wine. Choice of conditions and parameters study. Calibration curve and standard addition.

Practice 3 High-resolution liquid chromatography. Qualitative determination of additives in a cola

drink. Study parameters.

Practice 4 Gas Chromatography. Determination of alcoholic grade. Study of parameters.

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Practice 5 Potentiometry. Determination of chloride in samples. Study of parameters.

5.4.Planning and scheduling

http://veterinaria.unizar.es/gradocta/horarios1.php?COD_TITULACION=5

5.5.Bibliography and recomended resources

BB	Harris, Daniel C. : Análisis químico cuantitativo / Daniel C. Harris . 3ª ed. Barcelona [etc.] : Reverté, cop. 2007
BB	Skoog, Douglas A.. Fundamentos de química analítica / Douglas A. Skoog ... [et al.] . 8ª ed. Australia, Madrid [etc.] : Thomson, D.L. 2005

All the material of the course is in http://moodle2.unizar.es .