

30805 - Key techniques for chemical analysis

Syllabus Information

Academic year: 2023/24

Subject: 30805 - Key techniques for chemical analysis

Faculty / School: 105 - Facultad de Veterinaria

Degree: 568 - Degree in Food Science and Technology

ECTS: 6.0

Year: 1

Semester: Second semester

Subject type: Basic Education

Module:

1. General information

The main objective of the subject is to provide knowledge of the principles on which the instrumental techniques of chemical analysis are based, as well as the basic handling of instrumentation and to acquire the basic knowledge to apply analytical methods involving the use of instrumental techniques of analysis.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to the achievement of the goals:

Goal 3: Health and wellness.

Goal 4: Quality Education.

Goal 5: Gender Equality.

Goal 8: Decent Work and Economic Growth

Goal 10: Reduction of Inequalities

2. Learning results

In order to pass this subject, the students shall demonstrate they has acquired the following results:

Knows how to apply the principles on which the different instrumental techniques of analysis are based to solve analytical problems in Food Science and Technology.

Can numerically solve analytical calibrations (calibration line, standard addition, internal standard) and perform the necessary calculations to apply an analytical method.

Knows how to handle the instruments (interpret the manual in both English and Spanish, set measurement conditions, choose the most important parameters and carry out the measurements),

Can read, interpret, explain and perform a written analysis protocol in both Spanish and English

3. Syllabus

BLOCK I. INTRODUCTION

Introduction to the Instrumental Techniques of Analysis.

BLOCK II. Electroanalytical Techniques

Topic 2.-Potentiometry.

BLOCK III. Molecular Spectrometric Techniques.

Introduction to optical analysis techniques.

Molecular absorption spectrometry in the UV-Visible.

Molecular luminescence.

BLOCK IV. Atomic Spectrometric Techniques.

Flame atomic absorption spectrometry

Flame atomic emission spectrometry

BLOCK V. Chromatographic Techniques.

Topic 8. Introduction to chromatography.

Topic 9. Gas chromatography.

Topic 10. High performance liquid chromatography.

BLOCK VI. Laboratory practices

Practical 1 UV-Visible molecular absorption spectrometry.

Practical 2 Atomic absorption spectrometry.

Practical 3 High performance liquid chromatography.

Practice 4 Gas Chromatography.

Practice 5 Potentiometry.

4. Academic activities

40 hours of participative master classes: They are carried out alternating theory with examples, questions and problems.

They are supported by presentations that are available to students.

5 hours of seminars. problems and doubts will be solved and applied exercises will be performed.

15 hours of laboratory practice: The students are provided with a script with questions, calculations and conclusions to be drawn.

8 hours of supervised practical work. Preparation and team presentation of a practice.

76 hours of study and personal work

6 hours of assessment tests

5. Assessment system

Global test consisting of the following four evaluation activities:

Activity 1. Written test of short questions on theory and applied theory (essay type) (30% of the final grade). The adequacy of the answer, as well as the capacity of synthesis and correct reasoning will be valued.

Activity 2. Calibration problem solving written test (30% of the final grade). Both the approach to the problem, as well as the resolution, calculations and units will be valued.

Activity 3. Written test on practical teaching. A grade of 5 out of 10 will be required to pass this test (an indispensable condition for the student to be able to take activity 4) (10% of the final grade). The adequacy of the answer and the correct reasoning will be evaluated.

Activity 4. Practical laboratory exam. A grade of 5 out of 10 will be required to pass this test (30% of the final grade). Proper handling of instrumentation and material will be valued.

The learning results of activities 3 and 4 will be assessed alternatively during the practices as follows:

Activity 5. Practical script results and questions (10% of the final grade). The correct performance of the calculations and the adequacy of the answers and conclusions obtained, as well as the reasoning, will be assessed.

Activity 6. Completion and presentation of a tutored group work on practices (15% of the final grade). The correct interpretation of the protocol of the practice assigned, the capacity of synthesis, as well as the preparation of the presentation, clarity and order in the exposition will be valued. The attention and interest shown in the expositions will also be evaluated by means of a test of simple, multiple choice questions, ... on the presentations..

Activity 7. Written test of multiple-choice questions and short questions (essay) on the realization of the practices (15% of the final grade of the subject). The adequacy of the answer and the correct reasoning will be evaluated.

Practical teaching is considered passed if activities 3 and 4 are passed or additionally if the grade of activities 5+6+7 is higher than 4 out of 10.

In order to pass the subject, the final grade must be equal to or higher than 5 out of 10 points. The final grade is obtained:

a) Adding the grades of activities 1, 2, 3 and 4. It will be necessary to obtain at least:

4 points out of 10 for activity 1

4 points out of 10 in activity 2

pass activities 3 and 4

b) Adding the grades of activities 1, 2, 5, 6 and 7 It will be necessary to obtain at least:

4 points out of 10 for activity 1

4 points out of 10 in activity 2

4 points out of 10 in the activities 5+6+7.

