Universitat Autònoma de Barcelona

2019/2020

Chemistry II

Code: 103263
ECTS Credits: 6

Degree	Type	Year	Semester
2501925 Food Science and Technology	FB	1	2

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

Although there are no official prerequisites, it is appropriate that the student has achieved:

1) Some basic concepts of Chemistry of the baccalaureate: stoichiometry, dissolutions and chemical equilibrium.

2) The knowledge of Chemistry that has been acquired in the "Chemistry I" taught in the first semester.

Objectives and Contextualisation

The Chemical II subject in the degree.

This is a first-cycle subject, basic training, which reinforces the basic fundamentals of general chemistry that the student has, introduces the concept of analytical process and develops the main techniques of chemical, classical and instrumental analysis. These knowledge and skills will be very necessary for the student in subjects of subsequent courses where they develop in depth the methodologies of analysis of foods.

The laboratory practices related to this subject (classical and instrumental chemical analysis) will be carried out in the subject "Experimentation in the laboratory".

Competences

- Apply knowledge of the basic sciences to food science and technology.
- Communicate effectively with both professional and non-professional audiences, orally and in writing, in the first language and/or in English.
- Search for, manage and interpret information from different sources.
- Use IT resources for communication, the search for information within the field of study, data processing and calculations.

Learning Outcomes

1. Calculate concentrations of different types of analytes using instrumental analysis and chromatographic methods.
2. Calculate the pH of aqueous solutions of acids and bases, and of regulating solutions.

3. Classify the methods of chemical analysis.
4. Communicate effectively with both professional and non-professional audiences, orally and in writing, in the first language and/or in English.
5. Describe ionic equilibria in aqueous solution: acid-base, solubility, formation of complexes and oxidation-reduction.
6. Describe the concept of chemical equilibrium and the factors that can modify it.
7. Describe the fundamental principles of the classical methods of analysis, and calculate the concentrations of different types of analytes through a volumetric analysis.
8. Describe the fundamental principles of the principal chromatographic methods that are used the analysis of foods.
9. Describe the fundamental principles of the principal methods of instrumental analysis (optical and electrical) that are used in the analysis of foods.
10. Identify the different types of calibration in instrumental analysis.
11. Plan the strategy to follow at each stage of the analytical procedure that has been adopted to solve the problems faced, based on the material to be analysed and the objective of the analysis.
12. Recognise the stages in the analytic procedure in any type of analysis.
13. Search for, manage and interpret information from different sources.
14. Use IT resources for communication, the search for information within the field of study, data processing and calculations.
15. Work correctly with chemical equations and with the principal magnitudes of matter (mass, quantity of matter and concentration).

Content

Block I. Ionic equilibrium

Chemical reactions: stoichiometry and chemical equilibrium. Acid-base equilibrium. Equilibrium of solubility. Equilibrium of complex formation. Electrochemistry.

Block II. Analytical process and classical chemical analysis

Chemical analysis and analytical process. Volumetric analysis. Acid-base titrations. Complex formation titrations. Redox and precipitation titrations.

Block III. Instrumental chemical analysis

Quantitative instrumental analysis: calibration. Introduction to optical analysis methods. Molecular absorption spectroscopy. Absorption spectroscopy and atomic emission. Potentiometry Introduction to chromatography. Gas chromatography. Liquid chromatography.

Methodology

The development of the course is based on the following activities:

1) Theoretical classes (classroom)

The student acquires the own scientific knowledge of the subject attending the theoretical classes and complementing them with the personal study. The theoretical classes can be expositivas and classes of work individual or in group; The first activities are conceived as a fundamentally unidirectional method of transmitting the knowledge of the teacher to the student, while the latter involve a teacher-pupil interaction, and will count on the continuous assessment note.

2) Classroom practices (problems and seminars)

In the problem classes the scientific knowledge is worked on from the resolution of problems and / or practical cases. In these classes there must be a strong interaction between students and teachers in order to complete and deepen the understanding of the knowledge worked in the theoretical classes.

In the seminar classes the student works individually or in a group solving exercises and / or questions raised in the same class or in advance.

The sessions of problems and seminars should also serve as a solution to doubts and deepen certain key concepts of the subject.

Some of these activities will count for the continuous evaluation note.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classroom practices (problems)	11	0.44	13, 2, 4, 6, 7, 5, 8, 9, 1, 10, 11, 12, 15, 14
Classroom practices (seminars)	5	0.2	2, 6, 7, 5, 1, 10, 12
Theoretical classes	33	1.32	2, 3, 6, 7, 5, 8, 9, 1, 10, 11, 12, 15, 14
Type: Supervised			
Tutorials	6	0.24	2, 3, 6, 7, 5, 8, 9, 1, 10, 11, 12, 15
Type: Autonomous			
Autonomous learning	31	1.24	13, 2, 3, 4, 6, 7, 5, 8, 9, 1, 10, 11, 12, 15, 14
Self study	50	2	13, 2, 3, 4, 6, 7, 5, 8, 9, 1, 10, 11, 12, 15, 14

Assessment

The competences of this subject will be evaluated by means of:

a) A control of the blocks I and II (individual), with a weight of 35% of the final mark.

b) A control of block III (individual), with a weight of 35% in the final note.

c) Evidence of learning. Individual or group activities carried out in theory classes or classroom practices (problems or seminars). Overall, we will have a weight of 30% in the final note.

To approve the subject, it is asked:

a) A minimum of 3.5 points (out of 10) in each of the two controls; If you do not arrive at this note you will have to present yourself to the corresponding recovery test. To pass the subject, you must have a minimum of 3.5 points in each control once the recovery is completed.

b) A minimum of 3.5 points (out of 10) in the learning evidences. This part is not recoverable.

c) A minimum of 5 points (over 10) in the average of the controls and the learning evidences, according to the weighting established previously.

It will be considered that a student is not evaluable if he has participated in assessment activities that represent $\leq$ 15% of the final grade.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Control of block I and II	35	2	0.08	2, 3, 4, 6, 7, 5, 11, 12, 15
Control of block III	35	2	0.08	4, 8, 9, 1, 10
Evidence of learning	30	10	0.4	13, 2, 3, 4, 6, 7, 5, 8, 9, 1, 10, 11, 12, 15, 14

Bibliography

Basic bibliography

Anàlisi química quantitativa, D.C. Harris, trad. 6a ed, Reverté, 2006.

- Principios de Análisis Instrumental, D.A. Skoog, F.J. Holler i T.A. Nieman,. 5a ed, McGraw Hill, 2001.

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Complementary bibliography

Principios de Química, Atkins, Jones, 3a ed, Medica Panamericana, 2005.

- Química Analítica, G.D. Christian, 6a. ed, McGraw-Hill, 2009

- Fundamentos de Química Analítica, D.A. Skoog, D.M. West i F.J. Holler, 2 vol, 4a ed, Reverté, 2000.

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- Técnicas analíticas de separación, M. Valcárcel, A. Gómez Hens, Reverté, 1988 (reimp. 2003).

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- Introducción a la nomenclatura química, W.R. Peterson, Ed. Revertí, 2010

- El lenguaje químico, I. Solà, M. Terradellas, I. Torra, Ed. JONC, 1986.

- Introducción a la formulación y nomenclatura química: Inorgánico - Orgánico, Miguel Paraira Cardona y otros, Ed. Vicens-Vives, 1995