UAB
Universitat Autònoma de Barcelona

Basics of Chemistry

Code: 106750
ECTS Credits: 6

2025/2026

Degree	Type	Year
Environmental Sciences	FB	1

Contact

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Teachers

Roberto Boada Romero

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Students must hold the basic knowledge of high school chemistry courses:

1. Periodic Table

Concept of groups and files, and corresponding properties.

2. Expression of concentration

Mol concept. Molarity (M), molality (m), normality (N), % in weight or volume, etc.

3. Stoichiometry of chemical reactions

Stoichiometric calculations. Limiting reactant. Reaction efficiency ("yield").

4. Basic concepts of chemical equilibrium

Chemical equilibrium and equilibrium constant. Expressions of the equilibrium constant. Parameters that affect the chemical equilibrium.

5. Chemical formulation

Inorganic and organic compounds.

6. Chemical equation equalization ("balance")

Non-redox reactions and redox reactions (basic concepts).

Objectives and Contextualisation

The general objective of the Fundamentals of Chemistry subject (which is part of Subject 3: Fundamentals of chemistry for environmental sciences, CCAA) is to put students in contact, for the first time in their Degree studies of CCAA, with the fundamental concepts of Chemistry. It is intended that the students become aware of the chemical basics that help to read into a large part of the environmental problems, mainly emphasis will be placed on aquatic environments. There will also be a brief introduction to chemical analysis, which is useful for the identification and quantification of different parameters or chemical compounds in water, soil and atmosphere.

The most specific objectives of the subject are the following:

1) To know the most relevant chemical fundamentals about the different systems in aqueous equilibrium and their application and consequences in the environment.

2) To acquire basic knowledge of the classic and current techniques used in the analysis of the main environmental compounds.

3) To develop the necessary skills to solve chemical equilibrium questions and introduce them to problem solving based on chemical analysis, if possible related to cases of environmental interest.

4) Develop the necessary skills to work in a laboratory.

Learning Outcomes

1. CM05 (Competence) Determine the parameters and significant chemical magnitudes associated with environmental problems and basic practical cases in the field of chemistry.
2. CM06 (Competence) Suitably transmit the basic chemical information associated with an environmental problem, to the general public.
3. KM08 (Knowledge) Identify the main principles of Chemistry involved in environmental processes.
4. KM09 (Knowledge) Identify the principles of Chemical Equilibrium and the equilibrium of water related to certain environmental processes.
5. KM10 (Knowledge) Recognise the main methods and tools used in chemical analysis, useful for the analysis of environmental samples.
6. KM11 (Knowledge) Recognise the most important chemical parameters in Chemistry to define, analyse and manage environmental issues.
7. SM09 (Skill) Determine the constants and parameters of chemical parameters in water and their environmental implications.
8. SM10 (Skill) Collect, analyse, measure and correctly represent data and observations from the field of chemistry, using the magnitudes and units associated with basic chemical concepts correctly.
9. SM11 (Skill) Use techniques, material and tools for the chemical analysis of ssmples in the laboratory. safely.
10. SM12 (Skill) Express yourself in scientific language suited to fundamental chemical information.

Content

Unit 1. Introduction to the Fundamentals of Environmental Chemistry

Unit 2. Introduction to Chemical Analysis

Unit 3. Principles of Chemical Bonding

Unit 4. Principles of Chemical Equilibrium

Unit 5. Acid/Base equilibrium

Unit 6. Solubility equilibrium

Unit 7. Complexation equilibrium

Unit 8. Oxidation-reduction equilibrium

Unit 9. Classical methods: Volumetric analysis

Unit 10. Instrumental methods

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory practices	14	0.56	
Solving problem classes	10	0.4	
Theoretical classes	29	1.16	
Type: Supervised			
Tutoring	2	0.08	
Type: Autonomous			
Solving problems	43	1.72	
Study	48	1.92	

Theory classes:
The teacher imparts the basic knowledge of the subject in the theory classes, making sure that its applicability to the resolution of problems related to the environment is clear. Although apparently the students do not have a very active participation in this type of teaching, their participation will be promoted to the maximum.
Group and/or individual activities or evidences will be carried out in the classroom and outside the classroom

Problem solving classes:
They are essential for putting into practice the knowledge acquired and knowing how to apply it to solving problems. Here it is essential that the students have a very active participation, solving (or at least trying to solve) the problems proposed before the face-to-face class.
Some problems will be developed by the students and others by the teachers on the board.
The teacher may also require the delivery of problems solved by the students for correction and evaluation.

Laboratory practices:
Laboratory practices are very important from a double perspective, on the one hand they allow students to see the application in the real world of the knowledge acquired.

On the other hand, they will allow them to acquire the experimental methodology and learn techniques that will be useful in their future professional life.
The laboratory practices are mandatory, and a lack of attendance implies a suspension from the subject.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evidences	25%	0	0	CM06, KM08, KM09, SM09, SM10, SM12
Laboratory practices	15%	0	0	CM05, SM09, SM10, SM11, SM12
Partial exams	60%	4	0.16	CM05, KM10, KM11, SM09, SM10, SM12

The overall grade of the subject will be obtained through the following weighting:

- Exams (60%)

- Evidence (25%)

- Laboratory practices (15%)

To consider the course passed, the overall grade must be equal to or higher than 5.0.

1. PARTIAL EXAMS (60%):

There will be two written partial exams (25-35% each, depending on the number of teaching hours included) on the concepts of theory and problems (they eliminate subject matter).

Minimum grade of 3.5 for each partial to be able to choose to pass by partial, and thus be able to calculate the final grade weighting the different assessment activities.

In order to be weighted with the Evidence and Laboratory grade, the weighted grade of the Partial Exams must be equal to or greater than 4.0.

Otherwise, the student will have to take the retrieval assesment for the partial with a lower grade, or for both partials, if that's the case. Partials can be recovered separately. The grade of the retrieval exam will replace the previous grade in the calculation of the final grade. The grade of the partials after the retrieval must also be equal to or higher than 4.0 to be able to calculate the weighted average with the other activities.

To be able to attend the recovery, the student must have previously been assessed for continuous assessment activities that are equivalent to 2/3 of the final grade.

2. EVIDENCE OF LEARNING (25%):

Group and/or individual assessment or self-assessment activities will be carried out in the classroom and/or outside the classroom. Deliverable evidence can include work, problems solved in class or at home, written tests in class with or without material, etc. They can be done in theory or problems class and they can be without notice.

A minimum grade of 4.0 is required in order to be weighted with the rest of the assessment activities. If the grade is lower than 4.0,there will be no possibility of passing the subject. Anevidence not presented will have a mark of 0. If the Evidences are not presented, the student will be classified as "non-evaluable", regardless of the grade of the partial exams.

The evidence cannot be recovered.

3. LABORATORY PRACTICES (15%):

Laboratory practices are mandatory for everyone.

The Internship Reports (to be prepared during the internship, and to be presented at the end of each internship session) will be assessed and scored. The attitude and way of working in the laboratory will also be taken into account, and also the use of the laboratory notebook (it will be checked that an outline of the practice to be carried out is prepared in the notebook, as work prior to the practice, and the good collection of laboratory data will be reviewed). Weighting: Reports 80%, and notebook/attitude 20%.

Minimum grade to be able to make a weighted average with the other assessment activities: 5.0.

In some partial exams there may be questions related to practices.

Failure to comply with the laboratory rules will result in fail the laboratory practices assessment and therefore with the impossibility of passing the subject.

There will be a session prior to the practices to explain how it works and that will be mandatory. Your attendance will be monitored and non-attendance will mean lowering the final practice grade by 3 points.

Not Assessed:

It will be considered Not assessed if the number of assessment activities carried out is less than 30% of the total of those scheduled in the subject.

Others:

Any act of copying in any of the assessment activities will mean a zero in the subject, regardless of other disciplinary implications.

UNIQUE ASSESSMENT:

The laboratoy practices (15%) attendance is compulsory for everyone (see the previous section where their operation and evaluation isexplained).

Regarding the other assessment activities, students who select the single assessment will take a single exam for the entire subject (60%), and will hand in all the evidences (25%) on the same day.

If the student do not pass the 4.0 grade in the exam, will have the option to go to a retrieval exam, as long as have previously submitted the other assessment activities: the evidences and the laboratory reports.

The retrieval grade will be used to calculate the weighted final grade (provided and when the evidence exceeds 4.0 and the laboratory practice grade exceeds 5.0).

Bibliography

Basic bibliography:

1.- Ralph Petrucci, Wiliam Harwood, Geoffrei Herring, *Química General*, 10th Edició, Editorial: Prentice-Hall (Pearson), 2011. ISBN: 9788483226803

2.- Daniel C. Harris, *Anàlisi química quantitativa*, Translation 6th ed., Editorial: Reverté, 2006.

3.- Daniel C. Harris, Charles A. Lucy, *Quantitative Chemical Analysis*, 10th ed., Editorial: MacMillan Learning, 2020.

4.- C. Baird, *Química Ambiental*, Editorial: Reverté, 2001.

5.- Manuel Silva, José Barbosa, *Equilibrios iónicos y sus aplicaciones analíticas*, Editorial: SINTESIS, 2002. ISBN: 9788497560252

6.- R. Chang: *Química General*, 9th edició, Ed. McGraw-Hill, 2007

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Solving problem books:

J.A. López Cancio. *Problemas de Química. Cuestiones y ejercicios*. Prentice Hall, 2000

A. Navarrete, A. Garcia. *La resolución de los problemas en química*. Anaya, 2004

Formulation:

SALES; VILARRASA. *Introducció a la nomenclatura química*. 5th ed. Reverté SA, 2003

ON-LINE BIBLIOGRAPHY:

Química general: Principios y aplicacions modernas.

Ralph H. Petrucci, F. Geoffrey Herring, Jeffry D. Maduray, Carey Bissonnette. Ed. Pearson, 11a ed., Madrid, 2017.

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Petrucci, Ralph H.; Herring, F. Geoffrey; Madura, Jeffry D.; Bissonnette, Carey. Ed. Pearson, 12th ed., 2023.

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Harris, Daniel C.; Editorial Reverté, 2006, 3a Ed. (Translated from the 6th Ed. in English)

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Software

We will use Microsoft Excel.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan/Spanish	first semester	afternoon
(PAUL) Classroom practices	2	Catalan/Spanish	first semester	afternoon
(TE) Theory	1	Catalan/Spanish	first semester	afternoon
(TE) Theory	2	Catalan/Spanish	first semester	afternoon