UAB
Universitat Autònoma de Barcelona

Basic Chemistry

Code: 100915
ECTS Credits: 6

2025/2026

Degree	Type	Year
Biotechnology	FB	1

Contact

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Teachers

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Teaching groups languages

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

Prerequisites

Although there are no official prerequisites, it is advisable for the student to review the general concepts of chemistry, physics and mathematics acquired in the secondary education.

Objectives and Contextualisation

The general objective is to intruduce the student to the fundamental concepts of Chemistry. In the long run, it is intended that the student becomes aware of the importance of Chemistry and become familiar with these fundamental concepts od Chemistry.

The aim is to help the student to understand the chemical phenomena of the macroscopic world and to introduce him into the knowledge of the interactions between atoms and molecules at the microscopic level (through the atomic structure and bonding).

the main bases to understand the structure of matter at the microscopic level will be studied, relating them to the type of bond. We will present the basic concepts of chemical thermodynamics that will allow rationalization of macroscopic behavior and the concept of chemical equilibrium. Then, the most common equilibria will be studied and the basic notions of chemical kinetics will be presented.

Main objectives of the subject:

1) Introduce the microscopic vision of chemistry.

2) Knowing the macroscopic interpretation of chemical phenomena:

a. Chemical thermodynamics

b. Chemical equilibrium

c. Chemical kinetics

Learning Outcomes

1. CM10 (Competence) Calculate the relevant parameters associated with chemical equilibrium.
2. CM12 (Competence) Working collaboratively in teams to solve problems in the field of general chemistry.
3. KM10 (Knowledge) Describe chemical bonding and intermolecular forces.
4. KM12 (Knowledge) Define the main concepts in the field of thermochemistry and chemical kinetics.
5. SM10 (Skill) Correctly solve calculations relating to simple chemical reactions.
6. SM11 (Skill) Correctly interpret data and observations in the field of general chemistry.
7. SM12 (Skill) Determine the chemical properties of molecules relevant to living organisms and of special interest for biotechnological processes.

Content

1. Atomic structure
Hydrogen atom. Polyelectronic atoms. Electronic configurations. Periodic table. Periodic properties.
2. Chemical bond
Chemical bonding models. Covalent bond Lewis structures. Molecular geometry Polarity Hybrid orbitals Molecular orbitals
3. Intermolecular forces
Hydrogen bonding. Vander Waals Forces

. First law of thermodynamics.
Thermodynamic systems. Internal energy Heat and work. First law of thermodynamics. Reaction heat and standard states. Law of Hess.
5. Second law of thermodynamics.
Spontaneity. Entropy. Second principle of thermodynamics. Enterpic Change. Third principle of thermodynamics. Gibbs Energy
6. Definition of chemical equilibrium
Dynamic equilibrium. Expression of the equilibrium constant. Gibbs energy and equilibrium. Criterion of spontaneity. Variation of $\Delta_r G^o$ and K with the temperature. Principle of Le Chatêlier.
7. Acid-base equilibria
Acids and bases of Brønsted and Lowry. Constants of acidity and basicity. Concept and pH calculation. Buffer solutions
8. Electrochemistry
Equalization of redox reactions. Electrochemical cells. Cell potential. Standard chemical and biochemical reduction potentials. Equation of Nernst.
9. Fundamental concepts of chemical kinetics.
Reaction rate. Rate laws. Reaction order. Dependence of the rate constant with the temperature.
10. Reaction Mechanisms
Rate determining step. Approximation of the stationary state. Catalysis

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Exercises	15	0.6	CM10, CM12, SM10, CM10
Theory lessons	30	1.2	KM10, KM12, SM11, SM12, KM10
Type: Autonomous			
Problem solving and other activities	38	1.52	CM10, CM12, SM10, SM11, CM10
Study of the theoretical concepts	52	2.08	KM10, KM12, SM11, SM12, KM10

Master classes:

The student acquires the scientific-technical knowledge of the subject by attending master classes and complementing them with personal study of the topics explained.

The master classes are the activities that require less active participation by the student, since they are conceived as the transmission of knowledge by the teacher. However, its use greatly helps the achievement of knowledge.

Problem solving classes:

In these the scientific-technical knowledge exposed in the lectures will be put into practice through problem solving. Since the number of students in class will be half that in theory, active participation by students may be required.

practices:

Although in this subject there is no practical part, some of the practices that will be carried out in the Integrated Laboratory course are directly related to the concepts introduced in this 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
Partial examination	40% each one	5	0.2	CM10, KM10, KM12, SM10, SM11
Review activities	20%	10	0.4	CM10, CM12, KM10, KM12, SM10, SM11, SM12

Continuous assessment

The assessment will be carried out throughout the course:

Evaluation through review activities: Throughout the course, some review activities will be considered consisting of exercises that collect the main content of the subject and can be solved individually or in groups, self-assessments on the virtual campus, short tests in class or the virtual campus, etc ... These are intended Help the student to review the content of the subject.

The qualification of these activities will be equal to 20% of the final score and does not require a minimum to average the rest of the qualifications.

Evaluation by means of written tests: in this part, the scientific-technical knowledge of the subject obtained by the student, as well as his capacity for analysis, synthesis and critical reasoning, is evaluated individually.

Partial written tests: During the course two partial tests will be carried out that will evaluate the contents of the subject taught until that moment. Each partial test will have a weight of 40% of the final qualification of the subject. It will be necessary to achieve a 5.0 in each one of them so that it is done with average other qualifications of the subject. Students who do not score 5.0 in any of these tests must present themselves to the final test of the suspended part.

Final written test: Students who have not obtained at least 5.0 to one of the partial tests must attend this test. Exceptionally, students who have passed the partial tests may wish to improve the qualification. Even so, by doing so, they renounce the partial note. It will be necessary to obtain a minimum of 5 out of 10 to make average with the rest of the qualifications.

The students who have not been evaluated in a minimum of 2/3 parts of the total of evaluable activities or who have obtained a qualification inferior to 3.5 points out of 10 in the average of the two written tests written in the final will not be able topresent to the final test.

The global qualification will be:

Global Score = (Activity Review) * 0.2 + (Exams) * 0.8

To overcome the subject it will be necessary to obtain at least 5.0 points.

Use unauthorized methods during one of the examinations of the subject (copy or communicate with a colleague, use of cell phones, etc.) will be penalized with a "suspense" rating in the global subject of the subject.

Non-evaluable students

It is considered that a student is assessable when he has given 2 or more of the problems or is presented in the first partial test.

Single assessment

The single assessment will consist of a single test in which the contents of the entire subject program will be assessed. The test will consist of theoretical or test-type questions and problems. The score obtained in this test will account for 100% of the final score of the subject.

The single assessment test will take place on the same day, time and place as the last continuous assessment test of the subject. To overcome the subject it will be necessary to obtain at least 5.0 points in the single assessment test. Students who have not obtained at least 5.0 in this test must attend the final test to overcome the subject.

Bibliography

Bibliography

General textbooks of Physical Chemistry that encompass all the subject matter of the course:

- R. H. Petrucci, F. G. Herring, J. D. Madura, C. Bissonnette, Química General, Pentrice Hall (10th Ed.) 2011.
- R. H. Petrucci, F.G. Herring, J. D. Madura, C. Bissonnette, Química General, Pearson Prentrice Hall (11th Ed.) 2017.
- P. Atkins, L. Jones Chemical Principles: the quest for insight W.H. Freeman (5th Ed.) 2010.

Advanced texbooks:

- P. Atkins, J. de Paula Physical Chemistry, Oxford University Press (11th Ed.) 2018.

web:

Virtual space of the subject: http://cv.uab.cat

Software

No specific software is used.

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	411	Catalan/Spanish	first semester	afternoon
(PAUL) Classroom practices	412	Catalan/Spanish	first semester	afternoon
(TE) Theory	41	Catalan/Spanish	first semester	afternoon