

**Chemistry**

Code: 100765  
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	FB	1	1

### 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 is no special requirement for attending the course, it is advisable to have well acquired the contents of the subjects of chemistry, physics and mathematics of high school.

### Objectives and Contextualisation

Many of the vital processes studied in different courses of the Degree of Biology rely on the properties, interactions and reactivity of molecules. Chemistry is, therefore, a basic tool for developing these other courses within the Biology degree.

The goals of this "Chemistry" course in the Biology degree are to list and explain the parameters necessary to understand the properties and behavior of biological processes presented in subsequent courses.

### Competences

- Be able to analyse and synthesise
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Understand and interpret the physicochemical bases of the basic processes of living beings

### Learning Outcomes

1. Be able to analyse and synthesise.
2. Correctly manipulate chemical equations, equalise them and make stoichiometric calculations.
3. Describe conformational isomerism in alkanes and cycloalkanes and its application to biological systems.
4. Describe the fundamental principles underlying organic reactions and their application to biological systems.
5. Determine and represent the configuration of the chiral centres in chemical compounds and describe their properties and their importance in the field of biology.
6. Draw Lewis structures of chemical compounds and qualitatively predict the molecular properties based on these structures (molecular geometry and polarity).

7. Identify the functional organic groups present in biomolecules and name and formulate the corresponding organic compounds.
8. Identify the oxidation and reduction processes of a redox process and equalise the global reaction.
9. Solve basic problems in chemistry.
10. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.

## Content

Topic 1. Fundamentals of Chemistry.

Experimental sciences and scientific method. Chemistry and biology. Matter, its properties and its physical states. Ideal Gas Law. Chemical change: historical approach, fundamental laws. The mole. Concentrations. Solutions. Experimental measurement of concentrations.

Topic 2. Structure of matter: How is matter? Element, compound, atom, molecule, periodic table. Compounds and chemical bond. Molecular geometries. Intermolecular forces.

Topic 3. Energy: What causes a chemical reaction to take place?

What is energy? Transfer of energy. Enthalpy. Entropy: the distribution of energy as the engine of change.

Topic 4. Kinetics: What affects the speed of a reaction?

The speed of the reaction. Collision theory. Activation energy. Catalysis.

Topic 5. How far do chemical reactions go?

Reversible reactions: where is the balance? The reaction quotient. Disturbing balance. Gibbs energy and chemical balance.

Unit 6: Acids and bases.

Acid and base behavior in biological systems. Buffer solutions: maintaining the pH.

Topic 7: The carbon cycle: From carbon dioxide to ester.

Carbon and living things: origin and chemical transformations. Organic substances, the framework of life: properties and structure.

## Methodology

The Achievement of the knowledge of the course mandatory requires an important individual work from the student a part from the formal course. In this view, the use of general chemistry text books or other sources containing the basic concepts of general chemistry is strongly recommended to pass the course.

The course includes the following activities.

Master classes:

The professor presents the basic concepts related with the contents of the course, that students must complement during their study time, and will assist the students in solving their doubts.

During the last days of the course, 15 minutes will be reserved for the students to answer questions about the quality of the lessons.

Exercise classes:

Students will prepare the list of exercises proposed for each session previously and during the exercises courses, the professor will solve the key exercises as well as assist the students in those exercises that they have been unable to solve by their own.

Lab sessions:

The course includes two lab sessions in which some of the concepts of the course will be treated explicitly.

Tutoring activities:

The professors of the course will be available for individual tutoring when required. In addition to this, a few collective tutoring classes will be performed along the course to discuss the how the course is evolving and solve collective doubts on the concepts of the course.

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.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Exercice classes	12	0.48	4, 5, 6, 7, 8, 2, 9, 1
Lab session	8	0.32	4, 5, 6, 7, 8, 2, 9, 1
Magistral courses	30	1.2	4, 5, 6, 7, 8, 2, 9, 1
Type: Supervised			
Tutoring	3	0.12	4, 5, 6, 7, 8, 2, 9, 1
Type: Autonomous			
Resolution of exercises	20	0.8	4, 5, 6, 7, 8, 2, 9, 1
Revision activities	12	0.48	4, 5, 6, 7, 8, 2, 9, 1
Studing	50	2	4, 5, 6, 7, 8, 2, 9, 1

## Assessment

The correct accomplishment of the course competences by the students will be evaluated through three different types of evaluation activities, each of them having a given weight to the global grade and with specific requirements.

1. Partial exams: Two written partial exams will be done along the course to evaluate the contents (theory and exercises) seen up to that moment. The weight of each partial exam to the global qualification is 35 %. A minimum score of 4 (over 10) in each partial exam is mandatory in order to be accounted for in the final grade.

2. Revision activities: During the course, two or three additional activities will be proposed. These will be different from those done in the exercises classes: e.g. additional exercises, tests in moodle, individual or group tasks... These activities will be evaluated, and their average will have a 15 % weight to the global qualification. There is no minimal score required for that.

3. Lab sessions: At the end of each lab session, each couple of students will have to fill a questionnaire and give it back to the professors before leaving. This questionnaire will be corrected, and the average qualification of the two sessions will be used to define 15% of the final mark. A minimum score of 4,0 over 10 in each test is required. Assistance to the lab sessions is mandatory.

Thus, the final qualification will be calculated as:

$$\text{Final score} = \text{Exams} * 0,70 + \text{Revision} * 0,15 + \text{Laboratory} * 0,15$$

Overall, students will be considered to pass the course if their final score is equal or higher than 5,0 points (out of 10,0). Please, take into account that students will fail to pass (even if the final score is higher than 5,0) if they obtain less than 4,0 in at least one of the partial exams, less than 4,0 in any of the lab questionnaires or if they miss, without being conveniently justified, one lab session.

Students who failed passing the course (or parts of it) can go through a retake process. To be eligible for the retake process, the student should have been previously evaluated in a set of activities equalling at least two thirds of the final score of the course. Thus, the student will be graded as "No Avaluable" if the weighting of all conducted evaluation activities is less than 67% of the final score. The retake process can include only parts of the course that the student has failed to pass (first and/or second partial exams and/or lab tests) or the whole course contents if none of the parts have been passed. The retake score will be correspondingly accounted for in the final score calculation. The retake process will be done with a written exam at the end of the semester.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Lab session	15%	2	0.08	10, 4, 5, 6, 7, 8, 2, 9, 1
Partial exams	35% + 35%	6	0.24	4, 3, 5, 6, 7, 2, 9, 1
Revision activities	15%	7	0.28	4, 3, 5, 6, 7, 8, 2, 9, 1

## Bibliography

1. J. Crowe, T. Bradshaw. *Chemistry for the Biosciences*. Ed. Oxford University Press.
2. R. H. Petrucci *Química General* Ed. Pearson Prentice Hall. Electronic book:  
[http://www.ingebook.com.aren.uab.cat/ib/NPcd/IB\\_Escritorio\\_Visualizar?cod\\_primaria=1000193&libro=6751](http://www.ingebook.com.aren.uab.cat/ib/NPcd/IB_Escritorio_Visualizar?cod_primaria=1000193&libro=6751)
3. P. Atkins *Principios de Química* Ed. Paamericana.
4. R. Chang, *Química*, Ed. Mc Graw Hill.

## Software

There is no computer programs associated to this subject.