

| Degree               | Type | Year |
|----------------------|------|------|
| 2500502 Microbiology | FB   | 1    |

## Contact

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## Teaching groups languages

You can view this information at the [end](#) of this document.

## Prerequisites

Students must understand the essential Chemistry contents taught in the first and second of courses of Baccalaureate. As a reinforcement, they can take part in the "Química" preparation course offered at the Faculty of Sciences.

## Objectives and Contextualisation

It is an essential subject, since many of the vital processes that will be studied in other subjects of this Degree are explained using chemical formulation. Chemistry is, therefore, a basic tool to understand and develop other subjects of the Degree.

The objectives of the subject are:

1. Properly manipulate chemical equations, balance them and perform stoichiometric calculations.
2. Identify the processes of oxidation and reduction of a redox process and balance the global reaction.
3. Draw Lewis structures of chemical compounds and qualitatively predict their molecular properties (molecular geometry and polarity).
4. Identify the organic functional groups present in biomolecules, name and formulate the corresponding organic compounds.
5. Describe conformational isomerism in alkanes and cycloalkanes and its application in biological systems.
6. Determine and represent the configuration of the stereogenic (chiral) centers in chemical compounds and describe the properties and relevance of these compounds at a biological level.
7. Describe the basics of organic reactions and their applications in biological systems.
8. Solve basic chemical problems.

## Learning Outcomes

1. CM03 (Competence) Justify how chemical processes respond to society's demands, care for the environment and combat climate change and its effects.
2. CM04 (Competence) Integrate knowledge and skills related to chemistry to solve bioscience problems working individually and as a team.
3. KM05 (Knowledge) Define the basic concepts related to molecules.
4. KM06 (Knowledge) Define the laws governing chemical equilibrium, as well as the principles of thermodynamics and kinetics.
5. KM07 (Knowledge) Identify the organic functional groups present in biomolecules and metabolites, as well as their spatial distribution and their influence on organic reactions in biological systems.
6. SM03 (Skill) Interpret chemistry fundamentals to understand the molecular bases of biological processes.
7. SM04 (Skill) Properly manipulate chemical equations to equalise them and make stoichiometric calculations.
8. SM05 (Skill) Apply the basic foundations of chemistry in experimental situations related to biological processes.

## Content

CHAPTER 1: Basic Concepts in Chemistry: structure and properties.

CHAPTER 2: Chemical equilibrium. Thermodynamics and equilibrium. Equilibrium constant. Reaction kinetics. Weak acids and bases. Acid-Base Reactions. Buffer solutions. Oxidation and reduction. Oxidation degree and oxidation number.

CHAPTER 3: Lewis structures. Resonance. Basic bond concepts. Geometry of molecules. Dipolar moment of bonds and molecules.

CHAPTER 4: Organic functional groups: Alkanes, alkenes, alkynes, alcohols, halides, amines, carbonyl compounds, carboxylic acids. Aromaticity. Acidity in organic compounds. Nomenclature. Stereochemistry.

CHAPTER 5: Organic reactions in biological systems. Examples: substitution and elimination reactions, oxidation of alcohols, synthesis and hydrolysis of esters, transamination.

## Activities and Methodology

| Title            | Hours | ECTS | Learning Outcomes                        |
|------------------|-------|------|--|
| Type: Directed   |       |      |  |
| Supervised       | 8     | 0.32 | CM03, CM04, SM03, SM04, SM05             |
| Supervised       | 15    | 0.6  | CM04, KM06, KM07, SM03, SM04, SM05       |
| Supervised       | 32    | 1.28 | CM03, KM05, KM06, KM07, SM03, SM04, SM05 |
| Type: Supervised |       |      |  |
| Supervised       | 1     | 0.04 | KM05, KM06, KM07                         |

|                  |    |      |  |
|------------------|----|------|--|
| Type: Autonomous |    |      |  |
| Autonomous       | 9  | 0.36 | CM04, KM05, KM07, SM04                   |
| Autonomous       | 25 | 1    | CM04, KM06, KM07, SM04                   |
| Autonomous       | 56 | 2.24 | CM03, CM04, KM05, KM06, KM07, SM03, SM04 |

The development of the course is based on the following activities

#### Master Classes:

The teacher will give the basic contents related to the program and solve the questions of the students.

#### Problems:

Students will have to prepare the programmed problems at home and will discuss them in class with the teacher

#### Practices:

There will be two practices in the laboratory, which are mandatory, in which some of the knowledge acquired in the master classes will be applied.

#### Tutorials:

A tutoring class will be devoted to the nomenclature and others to solve doubts and to prepare the practices.

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                              |
|---|-----------|-------|------|--|
| a) Individual written work  | 10%       | 0     | 0    | KM05, KM07                                     |
| b) Laboratory module: a report of the laboratory practices will be evaluated. | 10%       | 0     | 0    | CM03, CM04, SM03, SM04, SM05                   |
| c) First written test   | 40%       | 2     | 0.08 | CM03, CM04, KM05, KM06, KM07, SM03, SM04, SM05 |
| d) Second written test  | 40%       | 2     | 0.08 | CM03, CM04, KM05, KM06, KM07, SM03, SM04, SM05 |

"Continuous avaluation"

The continuous evaluation of skills is organized in 3 modules, each of which will be assigned a specific weight in the final qualification:

- Written work module: learning and using a free nomenclature and molecular drawing program, which will be assessed with an individual essay. This module will have an overall weight of 10%.
- Laboratory module: a report on mandatory laboratory practices will be evaluated with a weight of 10%.
- Written "partial" tests module: it will consist of two partial tests, with a weight of 40% each.

In order to pass the subject, you must get at least 4 points out of 10 in each of the two written partial tests, the nomenclature work and the laboratory practices. The subject will be considered passed when the average of the modules is equal to or higher than 5 points out of 10.

Students who do not pass the evaluations of the partial tests module will be able to recover them on the scheduled date at the end of the semester. In order to make up for it, the student is required to take both partial exams.

Those who pass the subject will be able to improve their grade by taking the make-up exam. This improvement will be considered as long as the recovery grade is higher than the one obtained in the average of the modules. If the recovery grade is equal to or lower by less than 1 point, the grade of the average will be maintained. If the recovery grade is lower by 1 point or more than the average grade, the final grade will be considered as the average of the two grades.

Students who do not finally obtain the minimum grade required to pass each of the tests in the written partial tests module or the minimum grade to pass the written assignments module or the Laboratory module, will not pass the subject. In this case, the maximum final grade will be 4.

From the second registration of the subject, the student will not need to complete the laboratory module or the written work module if he/she achieved the skills of these parts of the subject in the previous year.

A student will obtain the grade of Non-Evaluable when the number of assessment activities carried out is less than 66% of those scheduled for the subject (the assignment, the three exams and the two practice sessions).

#### "Unique Assessment"

Students who have accepted the single assessment modality will have to take a final test and a "written work". In addition, they will have to present the mandatory laboratory reports at the end of each session together with the continuous assessment students. The final test will consist of a theory exam and problems where they will have to solve a series of exercises similar to those worked on in the Classroom Practice sessions. When they have completed it, they will hand in the report of the "Written assignments" module that will have been submitted to the student online at some point during the course. The grade for Laboratory Practices will be that of the average of the reports.

In order to pass the subject, they must get at least 4 points out of 10 in each of the three previous activities: final test, written work and laboratory practices.

The student's grade will be the weighted average of the three activities, where the theory and problems exam will account for 80% of the grade, the Laboratory Practice 10% and the report from the Written Assignments module the 10%

If the final grade does not reach 5 points, the student has another opportunity to pass the subject through the recovery exam that will be held on the date set by the coordination of the Degree whose content will be the same as that of the final test.

From the second registration of the subject, the students will not need to complete the laboratory practices or the written work if they achieved the skills of these parts of the subject in the previous year.

## Bibliography

- 1.- i) Bruice, P.Y. Organic Chemistry, 8<sup>th</sup> Ed. Ed. Pearson Education, 2017 (ISBN 9781292160344, ISBN 1292160349 ).
- ii) Bruice, P.Y. Essential Organic Chemistry, 3<sup>rd</sup> Ed. Ed. Pearson Education, 2016 (ISBN 9781292089034).
- 2.- Timberlake, K.C. Química: Una Introducción a la Química General, Orgánica y Biológica, 10<sup>a</sup> Ed. Ed. Pearson Educación, S.A. 2011 (ISBN 9788483227435).
- 3.- i) Holum, J.R. Fundamentos de Química General, Orgánica y Bioquímica para Ciencias de la Salud, 1a Ed. Editorial Limusa, México, 1999 (ISBN:968-18-4637-0).
- ii) Holum, J.R. Fundamentals of General, Organic and Biological Chemistry, 6th Ed. John Wiley & Sons Publishing, 1997 (ISBN-10 0471175749, ISBN-13 978-0471175742).
- iii) Holum, J.R. Elements of General, Organic and Biological Chemistry, 9th Ed. John Wiley & Sons Publishing, 1995 (ISBN 0471059064, ISBN 047111605X).
- 4.- Solomons T.W.G. Química Orgánica, 3<sup>a</sup> Ed. Ed. Limusa S.A. 2014 (Vol. 1: ISBN 10 9786070506963, Vol 2: [9786070506970](https://www.limusa.com.mx/9786070506970)).
- 5.- Carey F.A., Giuliano R.M. Química Orgánica, 9<sup>a</sup> Ed. Ed. McGraw-Hill, 2014 (ISBN 9786071512109).
- 6.- Química, (un proyecto para la A.C.S.), Editorial Reverte, 2007 (978-84-291-7001-6).
- 7- IUPAC Nomenclature of Organic Chemistry:
- i) <https://iupac.qmul.ac.uk/BlueBook/>
- ii) <https://publicacions.iec.cat/repository/pdf/00000195/00000013.pdf>
- iii) [https://www.upo.es/depa/webdex/quimfis/docencia/quimbiotec/Nomenclatura\\_organica.pdf](https://www.upo.es/depa/webdex/quimfis/docencia/quimbiotec/Nomenclatura_organica.pdf)
- 8.- ACD/ChemSketch for Academic and Personal Use. A Free Comprehensive Chemical Drawing Package: <http://www.freechemsketch.com>
- 9.- Pulido F. Nomenclatura de Química Orgánica: [http://es.slideshare.net/manoa21/nomenclatura-quimicaorganica-29646851?next\\_slideshow=1](http://es.slideshare.net/manoa21/nomenclatura-quimicaorganica-29646851?next_slideshow=1)
- 10.- Rosso V. Química Orgánica Nomenclatura: <http://es.slideshare.net/verorosso/quimica-organica-nomenclatura?qid=09239331-ba5c-4096-9104-dd4cb26fe6308>

## Software

ACD/ChemSketch for Academic and Personal Use. A Free Comprehensive Chemical Drawing Package: <http://www.freechemsketch.com>

## Language list

| Name                       | Group | Language | Semester       | Turn      |
|----------------------------|-------|----------|----------------|-----------|
| (PAUL) Classroom practices | 711   | Catalan  | first semester | afternoon |

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|                            |     |         |                |           |
|----------------------------|-----|---------|----------------|-----------|
| (PAUL) Classroom practices | 712 | Catalan | first semester | afternoon |
| (TE) Theory                | 71  | Catalan | first semester | afternoon |

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PROVISIONAL