Universitat Autònoma de Barcelona

2021/2022

Organic Chemistry

Code: 101893
ECTS Credits: 3

Degree	Type	Year	Semester
2501230 Biomedical Sciences	OB	1	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages

The sheets of problems and the assessment exercises will be delivered in Catalan or English.

Prerequisites

The students must have clear the contents of the subject of Chemistry that is taught in first and second of Baccalaureate.

Objectives and Contextualisation

Organic Chemistry studies the reactivity of carbon. Since living beings are formed by molecules based on the carbon atom, Organic Chemistry is a fundamental matter to understand the vital processes of these beings.

Basic ideas about energy relations, chemical equilibrium, conformational and stereochemical analysis of organic compounds are given. The different functional groups are studied and the structure of the compounds with the reactivity is related.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Work as part of a group with members of other professions, understanding their viewpoint and establishing a constructive collaboration.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
3. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
4. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
5. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
6. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
7. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
8. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
9. Work as part of a group with members of other professions, understanding their viewpoint and establishing a constructive collaboration.

Content

Chapter 1. Introduction to Organic Chemistry

Lewis structures, resonance, molecular geometry. Kinetic and thermodynamic stability of the carbon chains. Structures and formulas of organic molecules.

Chapter 2. Organic Compounds

Classification of organic compounds: functional groups; degree of oxidation; nomenclature, physical properties and molecular structure.

Chapter 3. Conformational and stereochemical analysis

Constitutional isomerism. Conformational isomers. Isomerism Z-E of the alquens. Stereoisomers: enantiomers and diastereomers. Chirality and its conditions. Optical activity. Configuration: representation and nomenclature. Racemic mixtures. Compounds with more than one stereogenic center: meso forms. Chiral compounds and their importance in living beings.

Chapter 4. Organic reactions in biological systems

Introduction to organic reactions. Reaction intermediates. Classification of organic reactions: reactions of addition, substitution and elimination. Oxidation and reduction reactions.

**Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents.*

Methodology

The student acquires the own knowledge of the subject attending the classes of theory that will complement with the individualized study.

Problems classes

The student consolidates the knowledge acquired in theory classes by solving problems. A dossier of exercises will be given that the students will have to solve during the course. A selected part of these exercises will be solved by problem teachers so that students learn the appropriate methodology to find the solutions. During this process, students'participation will be important. Teachers will help to develop the critical sense and logical reasoning in order to increase the ability of students to solve problems.

Classes of Practices

The laboratory classes focus on the learning of the basic techniques and to familiarize the student with the conditions of security that manipulation of chemical products requires. To be able to attend the sessions of laboratory practices, the student must justify having passed the security tests that will be found in the Virtual Campus and be knowledgeable and accept the rules of operation of the laboratories of the Faculty of Biosciences.

**The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities. While these restrictions were operative the theoretical lectures will be online.*

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			
Laboratory classes	8	0.32	9
Problems	4	0.16	9
Theory classes	20	0.8	9
Type: Supervised			
Tutorials	1	0.04	
Type: Autonomous			
Solving problems	8	0.32	9
Study	30	1.2	9

Assessment

A continuous evaluation of the competences will be carried out that will include a work and written tests.

The system is organized in 3 modules, each of which will have a specific weight assigned to the final grade:

- Written work module: the learning and use of a free molecular naming and drawing program with individual work will be evaluated. This module will have a weight of 10%.

- Laboratory module: a report of the laboratory practices with a weight of 10% will be evaluated.

- Module of partial written tests: it will consist of two partial tests with a weight of 40% the first, and of 40% the second. In order to pass the subject, the student must draw at least 4 points out of 10 in each of the two written partial tests and the work of nomenclature and laboratory practices must be done and approved. The subject will be considered to be exceeded when the average of the modules is equal to or greater than 5 points out of 10.

Students who do not pass the first partial exam may take a recovery exam.

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

From the second enrolment of the subject it will not be necessary that the student realizes the module of laboratory or the module of written works if the competences of these parts of the subject have been obtained in the previous course.

A student will obtain the Non-Evaluable qualification when the number of assessment activities carried out is less than 50% of those programmed for the subject (work, both partial tests and the two practical sessions).

**Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.*

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Laboratory	10%	0.5	0.02	7, 3
Test of theory and problems (first test)	40%	1.5	0.06	1, 8, 2, 7, 6, 5, 3, 4, 9
Test of theory and problems (second test)	40%	1.5	0.06	1, 8, 2, 7, 6, 5, 3, 4, 9
Written work	10%	0.5	0.02	7, 3

Bibliography

1.- i) Bruice, P.Y. Organic Chemistry, 8th Ed. Ed. Pearson Education, 2017 (ISBN 9781292160344, ISBN 1292160349).

ii) Bruice, P.Y. Essential Organic Chemistry, 3rd Ed. Ed. Pearson Education, 2016 (ISBN 9781292089034).

2.- Timberlake, K.C. Química: Una Introducción a la Química General, Orgánica y Biológica, 10ª 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.- SolomonsT.W.G. Química Orgánica, 3ª Ed. Ed. Limusa S.A. 2014 (Vol. 1: ISBN 10 9786070506963, Vol 2: 9786070506970).

5.- Carey F.A., Giuliano R.M. Química Orgánica, 9ª 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: http://www.acdlabs.com/iupac/nomenclature/

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

10.- Rosso V. Química Orgánica Nomenclatura: http://es.slideshare.net/verorosso/qumica-orgnica-nomenclatura?qid=09239331-ba5c-4096-9104-dd4cb26fe630&

11.- Hernández Santadaría J.A. Formulació i Nomenclatura de Química Orgànica.: http://es.slideshare.net/joseangelb7/formulacio-i-nomenclatura-organica?related=2

Software

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