UAB
Universitat Autònoma de Barcelona

Basic General Chemistry

2026/2027

Code: 100890
Credits: 6

Degree programme	Type	Course
Biochemistry	FB	1

Contact lecturer

Name : Sira Defaus Fornaguera

Email : sira.defaus@uab.cat

Teaching staff (external to UAB)

Sira Defaus Fornaguera

Group languages

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

Prerequisites

Although there are no official prerequisites, it is advisable for the student to review the general concepts of chemistry and biochemistry acquired in the baccalaureate.

Objectives

The general objective of the proposed program consists in the initiation of chemistry of molecules with an overview of the basic concepts. In this way, it is intended that the student acquires notions about atomic structure and covalent bonding and that he/she begins in the field of the molecular structure. This subject is understood as the basis to be able to develop the study of biomolecules in subsequent subjects.

Main objectives of the subject:

1. To introduce the basic concepts of atomic structure, bonding and equilibria.
2. To familiarize students with the nomenclature and structure of organic compounds based on functional groups.
3. To introduce the basic concepts of conformational analysis and stereochemistry of organic molecules.

Learning outcomes

- CM01 (Explain how chemical processes contribute to the Sustainable Development Goals.) Explain how chemical processes contribute to the Sustainable Development Goals.
- KM01 (Identify the socioeconomic and environmental impact of studying chemical processes in living organisms.) Identify the socioeconomic and environmental impact of studying chemical processes in living organisms.
- KM02 (Identify the principles of thermodynamics, stereochemistry and chemical equilibrium, as well as

the functional groups and reactivity of organic compounds present in biomolecules and metabolites.) Identify the principles of thermodynamics, stereochemistry and chemical equilibrium, as well as the functional groups and reactivity of organic compounds present in biomolecules and metabolites.
- SM01 (Apply the laws and principles of chemical equilibrium, thermodynamics and kinetics to biochemical processes.) Apply the laws and principles of chemical equilibrium, thermodynamics and kinetics to biochemical processes.

Contents

The course covers the following topics:

1. Atomic Structure. Introduction. Electronic structure of the atom. Electron configuration. The periodic table of the chemical elements and periodic properties.
2. Chemical Bonding. Introduction. The octet rule. Types of chemical bonds. Polarity. Lewis structures, formal charges, and resonance. Molecular geometry. VSEPR theory (Valence Shell Electron Pair Repulsion), Valence Bond Theory (VBT), and hybridization. Single and multiple carbon-carbon bonds. Intermolecular forces. Aromaticity.
3. Chemical Equilibrium. Acid-base theories. Lewis acidity and basicity. Acid-base equilibrium. Nucleophilicity and electrophilicity. Coordination compounds. Redox equilibrium.
4. Introduction to Organic Compounds. Structures and formulas of organic molecules. Nomenclature. Hydrocarbons. Main functional groups and oxidation states in organic compounds. Characterization of organic compounds.
5. Conformational Analysis. Isomerism. Concepts of composition, constitution, and conformation. Representation of conformations: Newman projections and sawhorse projections. Acyclic and cyclic systems. Conformational equilibrium and energetic aspects. Importance of conformation in biochemical systems.
6. Stereochemistry of Organic Compounds I. Geometric isomerism in carbon-carbon double bonds: *cis-trans* or *Z/E* isomers. Symmetry in organic molecules. Chiral molecules. Stereogenic centers. R/S configuration. Stereoisomerism: enantiomers, diastereomers, and meso compounds.
7. Stereochemistry of Organic Compounds II. Optical activity. Resolution: separation of enantiomers. Stereochemistry in organic reactions. The concept of prochirality. Tetrahedral prochirality: homotopic, enantiotopic, and diastereotopic groups. Trigonal prochirality: the *Re/Si* system. Stereochemistry in biology and medicine.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Resolution of problems	12	0.48	KM01, KM02
Magisterial classes	30	1.2	CM01, KM01, KM02, SM01
Study, resolution of problems in group, resolution of tests or individual activities	98	3.92	CM01, KM01, KM02, SM01

In accordance with the objectives of the subject, the student will be involved in a series of activities during the term to reach the established knowledge and skills. These sessions can be grouped into three different types:*

Master classes: In this case, students receive in person a series of knowledge articulated exclusively by the teacher. This scientific-technical knowledge is intended to serve as a platform for further maturation by students. In any case, the participation of students will be encouraged through the revitalization of classes through the resolution of cases and questions on a regular basis.

Audiovisual Material: A copy of the master classes will be provided in PDF, so that the students can review at

home those knowledge taught in the classroom.

Problem classes: In these sessions, students will put into practice, in a directed manner, the knowledge acquired in the master classes and the work derived from them. Special emphasis will be made on the active participation of the students when solving the problems that arise, as well as other proposed exercises. These exercises, in some cases, will be presented so that through the solutions proposed by the students, the objectives to be achieved can be evaluated.

Individual/group work: Resolution of exercises to submit during the course of the lessons.

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
First partial test	40	2.5	0.1	CM01, KM01, KM02, SM01
Second partial test	50	2.5	0.1	CM01, KM01, KM02, SM01
Evidences	10	5	0.2	CM01, KM01, KM02, SM01

Option A. Continued assessment (default)

1. Individual assessment in partial examinations: in this part the scientific-technical knowledge of the subject acquired by the student is evaluated individually, as well as his capacity of analysis and synthesis and of critical reasoning.

The assessment of the exams represents the 90% in the final grade, and it will consists of 2 partial tests with a weight of 40% the first and 50% the second. The assessed subject will include all that subject taught up to the date of the exam. In order to access the grade per course, it is mandatory to pass both partial tests (mark $\geq$5.0). The student who has not passed one or two tests can apply for the recovery exams.

To participate in the recovery, students must have been previously examinated in a set of activities whose weight is equivalent to a minimum of two thirds of the total grade of the subject or module. Therefore, students will obtain the grade of \"Non-Assessable\" when the assessment activities performed have a weighting of less than 67% in the final grade.

It will also be possible to present (1st partial, 2nd partial or both partial) those students who, despite having passed more than 5.0 of both partial exams, want to raise the mark, with the understanding that the mark of the final exam will be the mark of the recovery test. Students interested in doing so must notify the teacher at least two weeks in advance of the date of the final test.

2. Evidences: module will have a weight of 10%.

Students who have a obtained a final mark greater than or equal to 5.0 points out of 10 will pass the course.

Option B. Single evaluation (option to apply for academic bioscience management and responsible professor)

Thesingle evaluation will consist of a single test in which the contents of the entire subject program will be evaluated. The test will consist fundamentally of a written test where theoretical/practical exercises will have to be solved. The note obtained in this assessment will represent 100% of the final note of the subject.

The single evaluation test will be held on the same day, time and place as the last continuous evaluation test of the subject (Parkial 2 QO, in the official schedule). The subject will be approved by obtaining a rating equal to or greater than 5.0 points out of 10.

The single assessment can be recovered on the day set by the overall recovery of the subject.

Any irregularity in an assessment activity (academic fraud, plagiarism, or unauthorized use of AI, unless such use is explicitly permitted in the course syllabus) that may lead to a significant alteration of the grade will result in a mark of 0 for that assessment. If the course syllabus establishes a minimum grade in that assessment as a mandatory requirement to pass the course, or if multiple irregularities are committed in assessment activities for the same course, the final grade for the course will be 0. In addition, disciplinary proceedings may be initiated against any student involved in such irregularities.

Bibliography

1.- Petrucci Ralph H. *Química General* (Décima edición), Ed. Pearson Educación, 2011 (ISBN: 978-84-8322-680-3)

2.- Chang, Raymond. *Química* (Décima edición), Ed. McGraw-Hill Educación, 2010 (ISBN: 978-607-15-0307-7)

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

iii) Bruice, P. Y. *Química Orgánica*, 5ª Edición, Ed. Pearson Educación, México, 2008 (ISBN 9789702607915). Edición online de libre acceso:

4.- Timberlake, K.C. *Química: Una Introducción a la Química General, Orgánica y Biológica*, 10ª Ed. Ed. Pearson Educación, S.A. 2011 (ISBN 9788483227435).

5.- i) Holum, J.R. *Elements of General, Organic and Biological Chemistry*, 9th Ed. John Wiley & Sons Publishing, 1995 (ISBN 0471059064, ISBN 047111605X).

ii) 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).

iii) Holum, J.R. Fundamentals of General, Organic and Biological Chemistry, 6th Ed. John Wiley& Sons Publishing, 1997 (ISBN-10 0471175749, ISBN-13 978-0471175742).

6.- Solomons T.W.G. *Química Orgánica*, 3ª Ed. Ed. Limusa S.A. 2014 (Vol. 1: ISBN 10 9786070506963, Vol 2: 9786070506970).

7.- Química*, (un proyecto para la A.C.S.),* Editorial Reverte, 2007 (978-84-291-7001-6).

8- 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

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

10.- Pulido F. Nomenclatura de Química Orgánica: http://es.slideshare.net/manoa21/nomenclatura-quimicaorganica-29646851?next_slideshow=1

11.- Rosso V. Química Orgánica Nomenclatura: http://es.slideshare.net/verorosso/qumica-orgnica-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

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	31	Catalan	first semester	afternoon
(PAUL) Classroom practices	311	Catalan	first semester	afternoon