1. OVERVIEW

Subject Area	General Chemistry
Degree	Bachelor's Degree in Biotechnology
School/Faculty	School of Biomedical and Health Sciences
Year	First
ECTS	9
Type	Core
Language(s)	Enlgish
Delivery Mode	On campus
Semester	1º and 2º
Academic Year	24-25
Coordinating professor	Viviana Negri
Teacher	Adrián Esteban Arranz

2. INTRODUCTION

General Chemistry is part of the Chemistry module taught in the first cycle of the Degree in Biotechnology. It is a core subject and is worth 15 ECTS, divided over years 1 (General Chemistry) and 2 (Organic Chemistry).

General Chemistry is one of the core subjects worth 9 ECTS and is delivered each year in the first year of the Bachelor's Degree in Biotechnology. The overall objective of this subject area is to teach students the basic aspects of chemistry that are most relevant to biotechnology.

The aim of this subject area is for students to expand their knowledge of chemistry beyond that acquired from their high school studies. The knowledge and skills acquired will provide students with the chemical foundations required to carry out subsequent studies with a high level of autonomy.

The aim is for students to have detailed knowledge of concepts from a microscopic point of view, covering atoms to molecules and then to states of aggregation (solids, gases and liquids). Deep knowledge of the intermolecular bonds and forces will provide students with an understanding of the properties of matter in general, but in particular, of biological systems. We will also deal with chemical reaction and equilibrium in the most common solutions such as acid-base, precipitation and redox reactions, and see how they are applied in the main biological processes. As a result, students will have the tools to understand, design and modify different biotechnological procedures.

The contents of this subject area form the basis for subject areas studied later in the degree such as Organic Chemistry, Biochemistry, Instrumental Techniques and Protein Chemistry and Engineering and are very useful for the proper monitoring and understanding of topics covered in other modules of the degree.

3. LEARNING OUTCOMES (RA, by the acronym in Spanish)

Knowledge (CON, by the acronym in Spanish)

CON01. Describe organic compounds, their properties and basic formula and the function of chemical elements in metabolic processes.

- Be aware of the work involved in a general chemistry laboratory and organic synthesis.
- Recognise the function of chemical elements in the basic metabolic processes of life.

Abilities (HAB, by the acronym in Spanish)

HAB01. Apply acid-base and redox reactions, together with the reaction mechanism of chemical compounds for studying acid-base equilibrium and redox reactions which take place in biological systems.

- Apply knowledge of the atomic structure, nuclear stability, electron configuration, and binding models to the field of biotechnology.
- Achieve spoken and written mastery of the language and terminology of inorganic and organic chemistry, with flexible knowledge of concepts, technical terms and basic formula.
- Apply knowledge of the acid-base and redox processes which take place in solution, know how to calculate the acid-base equilibrium and redox reactions in biological systems.

Skills

COMP04. Identify and analyse the physical and chemical properties of matter and how its structure determines its reactivity and function.

COMP06. Develop the skills needed to use the most common equipment, instruments and basic techniques in biotechnology, following quality standards and current biosecurity regulations.

4. CONTENTS

- Atomic structure and the periodic table.
- Chemical bonds and intermolecular forces.
- Solutions. Colloids.
- Chemical equilibrium. Acid-base equilibria. Buffer solutions.
- Oxidation-reduction reactions. Electrochemistry.
- Solubility and precipitation.
- Coordination compounds.
- Biotechnological applications in inorganic chemistry.

The subject area is divided into two learning units, which are then divided into topics (four to five topics depending on the unit):

Unit 1. The Structure of Matter

- Topic 1. Atomic structure and the periodic table.
- Topic 2. Chemical bonds.
- Topic 3. Intermolecular forces. Liquids and solids.
- Topic 4. Coordination compounds.
- Topic 5. Solutions. Colligative properties.

Unit 2. Chemical Reactivity and Equilibrium

- Topic 6. Reactions in aqueous solution. Chemical equilibrium.
- Topic 7. Acid-base equilibria. Buffer solutions.
- Topic 8. Oxidation-reduction reactions. Electrochemistry.

- Topic 9. Solubility and precipitation.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Lecture.
- Collaborative learning.
- Problem-based learning.
- Learning based on workshop teaching
- Learning based on laboratory teaching

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On campus:

Learning activity	Number of hours
Lectures	45
Asynchronous master lectures	22
Debates and discussions	2
Problem-solving	59
Written reports and essays	2
Tutorials	18
Independent working	56
Workshops or laboratory activities	14
On-campus knowledge tests	7
TOTAL	**225**

7. ASSESSMENT

The assessment methods, together with how much they each count towards the final grade for the subject area, are as follows:

On campus:

Assessment system	Weight
Reports and written work	20%
Case study/problem scenario	5%

Laboratory practice	15%
Knowledge tests	60%

On the Virtual Campus, when you open the subject area, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

7.1. Ordinary exam period

To pass the subject area in the ordinary exam period you must obtain a mark of 5.0 or more out of 10.0 in all assessed parts of the subject. Any part you do not pass in the ordinary exam period will need to be recovered in the extraordinary exam period (resits).

Your final grade will be the average of the partial marks in each of the learning activities you have passed. The continuous assessment system for the learning activities requires attendance to at least 50% of the classes.
It is compulsory for students studying degrees on-campus to accredit attendance to at least 50% of classes. This requirement qualifies students for the right to obtain academic counselling, support and monitoring from the professor. Failure to accredit attendance to at least 50% of the classes by any of the means proposed by the University will mean that the professor awarding a fail to the student for that subject area in the ordinary exam period in accordance with the grading system outlined in these regulations. All of the above, without prejudice to the other requirements or higher attendance percentages that other faculties may stipulate in their learning guides or internal regulations. Regulations for the assessment of official degree programmes, Art. 1 point 4.

(*https://universidadeuropea.com/documents/1798/6.__Reglamento_evaluacion_titulaciones_oficiales_grado_UEM_v2.pdf*)

In any case, you must achieve a grade greater than or equal to 5.0 in the objective tests so they can be used for the average with the other activities.

7.2. Extraordinary exam period (resits)

To pass the subject area in the ordinary exam period you must obtain a mark of 5.0 or more out of 10.0 in all assessed parts of the subject. Any part you do not pass in the ordinary exam period will need to be recovered in the extraordinary exam period (resits).

Your final grade will be the average of the partial marks in each of the learning activities you have passed.

The continuous assessment system for the learning activities requires attendance to at least 50% of the classes.

It is compulsory for students to accredit attendance to at least 50% of classes. This requirement is essential to the assessment process and qualifies students for the right to obtain academic

counselling, support and monitoring from the professor. To this end, students must use the technological means made available by the University to accredit their daily attendance to each of their classes. This system will also serve to guarantee an objective record of the active role of the students in the classroom. Failure to accredit attendance to at least 50% of the classes by any of the means proposed by the University will mean that the professor awarding a fail to the student for that subject area in the ordinary exam period in accordance with the grading system outlined in these regulations. All of the above, without prejudice to the other requirements or higher attendance percentages that other faculties may stipulate in their learning guides or internal regulations. Regulations for the assessment of official degree programmes, Art. 1 point 4.
(http://www.uem.es/myfiles/pageposts/reglamento_evaluacion_titulaciones_oficiales_grado.pdf).

8. TIMELINE

The timeline with delivery dates of assessable activities in the subject area is indicated in this section:

Assessable activities	Date
Activity 1. Solving problems and applied activities individually or as a group – written texts	Week 2-35
Activity 2. Case study/problem – report writing: Inquiry based learning (IBL)	Week 15, 21, 25, 29, 34
Activity 4. Laboratory practice	Week 4 and 21-31
Activity 5. Knowledge tests	Week 19 and 34
Activity 1. Solving applied activities individually or as a group – written texts	Week 2-38
Activity 1. Solving applied activities individually or as a group – written texts	Week 2-38

The timeline may be subject to modifications for logistical reasons of the activities. Students will be informed of any changes in due time and course.

9. BIBLIOGRAPHY

The reference work for following this subject area is:

- Química. R. Chang. 10ª Ed. Madrid: McGraw-Hill, 2010. Disponible en formato electrónico a través de la biblioteca Crai Dulce Chacón.
- Química general. D. D. Ebbing. 5ª Edición. México: McGraw-Hill, 1997.
- Química General. R.H. Petrucci, W.S. Harwood, 6ª Edición. Madrid: Prentice Hall, 2010.

The recommended bibliography is indicated below:

- La Resolución de Problemas en Química, Navarrete y A. García, Ed. Anaya (Colección Iniciación a la Química Superior), 2004.

- Nomenclatura y Formulación de los Compuestos Inorgánicos: una guía de estudio y autoevaluación. E. Quiñoa, R. Riquera. Madrid, McGraw-Hill, 2006.
- Problemas de química. J.A. López Cancio. Madrid, Prentice Hall, D.L. 2001.
- Química Inorgánica. D.F. Shriver, PW. Atkins, C.H. Langford. Barcelona, Reverté, 2007.

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

The Educational Guidance and Diversity Unit (ODI in Spanish) offers support throughout your time at university to help you with your academic achievement. Other cornerstones of our educational policy are the inclusion of students with special educational needs, universal access in all our university campuses and equal opportunities.

This ODI unit offers students:

1. Support and monitoring through counselling and personalised student plans for those who need to improve their academic performance.
2. Curricular adaptations to uphold diversity, with assistance for those students who require specific educational support, leading to equal opportunities without significant changes to methodology or evaluation.
3. We offer students a range of extracurricular educational resources to reinforce skills which will enhance their personal and professional development.
4. Career guidance by offering tools and advice to students with doubts regarding their professional careers or those who believe they have chosen the wrong line of study.

Students who need educational support can contact us at:
orientacioneducativa@universidadeuropea.es

11. SATISFACTION SURVEYS

Your opinion matters!

Universidad Europea encourages you to complete our satisfaction surveys to identify strengths and areas for improvement for staff, degree courses and the learning process.

These surveys will be available in the surveys area of your virtual campus or by email.

Your opinion is essential to improve the quality of the course.

Many thanks for taking part.