1. OVERVIEW

Subject Area	Applied Chemistry
Degree	Human Nutrition and Dietetics
School/Faculty	Biomedical and Health Sciences
Year	1º
ECTS	6 ECTS
Type	Core
Language(s)	Spanish
Delivery Mode	On campus and blended
Semester	First
Coordinating professor	Dr Mª Mercedes Alonso Cascón

2. INTRODUCTION

The subject area Chemistry is a core subject area worth 6 ECTS credits, delivered over one semester in the first year of the Bachelor's Degree in Human Nutrition and Dietetics. The overall objective of this subject area is to teach students the basic aspects of chemistry that are most relevant to nutrition.

The aim of this subject 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 core lines of study within the subject area will allow students to understand the fundamental concepts of general chemistry.

Students are expected to learn the fundamentals of the atom, solutions, general principles of chemical reactions and chemical equilibrium, as well as the concepts of heat, work and energy, and their role in the calculation of the energy content in food. Learning about chemical kinetics and its application to metabolism will provide students with an understanding of processes in living systems.

It also deals with organic and inorganic nomenclature, stereochemistry, mechanisms and types of organic reactions and how they apply to different functional groups in biological/biochemical processes and to nutrition and dietetics.

The contents of this subject area form the basis for subject areas studied later in the degree and are very useful for following and understanding topics covered in other modules of the degree.

3. SKILLS AND LEARNING OUTCOMES

Key skills (CB, by the acronym in Spanish):

- **CB1**. Students have shown their knowledge and understanding of a study area that builds on general secondary school education, and are usually at the level where, with the support of more advanced textbooks, they may also demonstrate awareness of the latest developments in their field of study.
- **CB2**. Students can apply their knowledge to their work professionally and possess the necessary skills, usually demonstrated by forming and defending opinions, as well as resolving problems within their study area.
- **CB4:** Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

General skills (CG, by the acronym in Spanish):

- **CG8:** Identify and classify foods and food products. Know how to analyse and determine their composition, properties, nutritional value, the bioavailability of their nutrients, organoleptic properties and the modifications they undergo as a result of technology and the cooking process.

Cross-curricular skills (CT, by the acronym in Spanish):

- **CT4:** Adaptability: ability to detect, interpret and respond to a changing environment. Ability to equip themselves and work effectively in different situations and/or with different groups or individuals. This means adapting to change depending on circumstances or needs. It involves the confidence to take on crucial challenges on a personal or group level, maintaining good physical and mental health to allow effective work to be carried out.
- **CT6:** Problem solving: ability to solve an unclear or complex issue or situation which has no established solution and requires skill to reach a conclusion.
- **CT9:** Ability to put knowledge into practice, using the skills acquired in the classroom to mock situations based on real life experiences that occur in the relevant profession.

Specific skills (CE, by the acronym in Spanish):

- **CE19:** Be familiar with the fundamental concepts of chemistry: thermodynamics, chemical kinetics, solutions and chemical reactions.
- **CE20:** Know about the general transformations of organic compounds.
- **CE21:** Know how to apply instrumental techniques to the study of food: visible and ultraviolet spectroscopy, chromatography, electrophoresis and atomic absorption.

Learning outcomes (RA, by the acronym in Spanish):

- **RA1:** Identify the chemical structure of an active substance, describe its functional groups and classify it according to the chemical family to which it belongs.
- **RA2:** Acquire the appropriate ability and skill to carry out a chemistry lab experiment.
- **RA3:** Know the chemical foundations that apply to food and their most significant chemical reactions.
- **RA4:** Know how to use the chemistry terms used in health sciences.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes
CG8, CB1, CB4, CT4, CE19, CE21	**RA1:** Identify the chemical structure of an active substance, describe its functional groups and classify it according to the chemical family to which it belongs.
CG8, CB2, CB4, CT4, CT6, CT9, CE19, CE20, CE21	**RA2:** Acquire the appropriate ability and skill to carry out a chemistry lab experiment.
CG8, CB1, CB2, CT4, CT6, CE19, CE20	**RA3:** Know the chemical foundations that apply to food and their most significant chemical reactions.
CG8, CB1, CB4, CT4, CE19, CE21	**RA4:** Know how to use the chemistry terms used in health sciences.

4. CONTENTS

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

Unit 1. The Structure of Matter. General Concepts of Chemistry

- Topic 1. The atom and chemical compounds.
- Topic 2. Solutions and colloids.

Unit 2. Chemical Reactivity and Equilibrium

- Topic 3. Chemical reactions in water-based solutions. Chemical equilibrium.
- Topic 4. Acid-base equilibria. Buffer solutions.
- Topic 5. Oxidation-reduction reactions. Electrochemistry.

Unit 3. Organic Chemistry

- Topic 6. Structure and properties of organic compounds.
- Topic 7. Stereoisomerism.
- Topic 8. Introduction to the reactivity of organic compounds.
- Topic 9. Functional groups I: alkanes, alkenes, alcohols and amines.
- Topic 10. Functional groups II: Ketones, aldehydes, carboxylic acids and acid derivatives.

Unit 4. Thermodynamics and Chemical Kinetics

- Topic 11. Thermochemistry.
- Topic 12. Chemical kinetics.

Unit 5. Instrumental Techniques

- Topic 13. Instrumental techniques: principles and techniques of spectroscopy.
- Topic 14. Non-spectroscopic, chromatographic instrumental techniques.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Lecture.
- Problem-based learning.
- Simulated environments
- Learning based on workshops/labs.

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
Lecture	40
Problem-solving	25
Group activities	10
Tutorials	5
Independent working	45
Workshops and/or lab work	20
Knowledge tests	5
TOTAL	**150**

Blended learning

Learning activity	Number of hours
Reading of content	18
Problem-solving	20
Group activities	5
Online seminars	10
Online tutorials	10
Independent working	62
Workshops and/or lab work	20
Knowledge tests	5
TOTAL	**150**

7. ASSESSMENT

The assessment methods, together with their respective weighting towards the final grade for the subject, are as follows:

On campus:

Assessment method	Weighting
Learning portfolio	10%
Laboratory work	20%
Performance observation	10%
Knowledge tests	60%

Blended:

Assessment method	Weighting
Learning portfolio	10%
Laboratory work	20%
Performance observation	10%
Knowledge tests	60%

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

8. BIBLIOGRAPHY

The recommended bibliography is indicated below:

General bibliography:

- Química General. R.H. Petrucci, W.S. Harwood, 6ª Edición. Madrid: Prentice Hall, 2010.
- 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 Orgánica. D. Klein. Editorial Médica Panamericana, 2013.

Additional bibliography:

- La Resolución de Problemas en Química, Navarrete y A. García, Ed. Anaya (Colección Iniciación a la Química Superior), 2004.
- Química de los Alimentos. S. Badui Dergal. México, Pearson Educación, 2006. Disponible en formato electrónico a traves de la Biblioteca Crai Dulce Chacón.
- 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.

Relevant websites:

- http://tablaperiodica.educaplus.org/
- http://concurso.cnice.mec.es/cnice2005/93_iniciacion_interactiva_materia/curso/materiales/atom o/celectron.htm
- https://www.quimicaorganica.org/
- http://phet.colorado.edu/en/simulations/translated/es. Animaciones de química
- http://ntic.educacion.es/w3/eos/MaterialesEducativos/mem2011/aformular/
- http://www.rseq.org/. Real Sociedad Española de Química

There will also be additional documentation available for students on the virtual campus.