1. OVERVIEW

Subject Area	Biochemistry
Degree	Bachelor's Degree in Human Nutrition and Dietetics
School/Faculty	Biomedical and Health Sciences
Year	First
ECTS	6 ECTS
Type	Core
Language(s)	Spanish
Delivery Mode	On-campus and blended
Semester	Second semester
Coordinating professor	Claudia Carabaña García

2. INTRODUCTION

Biochemistry is a subject area that forms a substantial part of today's understanding of nutrition and of students' professional development. The study of biochemistry, as a core subject area, is essential for understanding the structural basis of cells and the processes underlying their metabolic functioning. In-depth knowledge of the biochemical processes of metabolism and their integration in the functioning of the human body is crucial to the main activity and most important advances in the field of human nutrition and dietetics today. Therefore, this subject area covers a range of topics, from the study of the most important biomolecules to the complex metabolic pathways that underpin all biological processes that take place during the development and adult life of individuals, both in physiological and pathological situations. Biochemistry is a fundamental area in the training of professionals in the fields of biomedicine, nutrition and health in general.

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.

- **CB3:** Students have the ability to gather and interpret relevant data (usually within their study area) to form opinions which include reflecting on relevant social, scientific and ethical matters.
- **CB4**: Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

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

- **CT1:** COMMUNICATION: Ability to engage in active listening, ask questions and respond in a clear and concise way, as well as to effectively express ideas and concepts. This includes concise and clear written communication.
- **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 a good physical and mental health to allow work to be carried out effectively.
- **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):

- **CE11:** Master the basic techniques of lab work.
- **CE12:** Know the foundations of biochemistry.
- **CE13:** Know the structure, classification and properties of proteins, carbohydrates, fats, nucleotides and nucleic acids.
- **CE14:** Be familiar with the basics of proteins, carbohydrates, fats and nucleotides.
- **CE15:** Understand the concepts of anabolism and catabolism, enzyme regulation.

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

- **RA1:** Be familiar with cellular metabolism.
- **RA2:** Demonstrate knowledge of the biochemical foundations that apply to human nutrition and dietetics.

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

Skills	Learning outcomes
CB2, CB3, CT4, CT6, CE11, CE12 and CE13	**RA1**. Demonstrate knowledge of the biochemical foundations that apply to human nutrition and dietetics.
CB1, CB4, CT1, CT9, CE12, CE14 and CE15.	**RA2**. Be familiar with cellular metabolism.

4. CONTENTS

This subject area is divided into six learning units (UA, by the acronym in Spanish), which are then divided into various topics. Furthermore, the overall set of objectives established for the module is specifically linked to each unit:

LEARNING UNIT 1. Introduction to Biochemistry.

- **Topic 0.** Introduction to the subject area

- **Topic 1**. General principles of Biochemistry. Structure and properties of water
- **Topic 2**. Enzymes and enzyme catalysis

LEARNING UNIT 2. Structure and function of carbohydrates

- **Topic 3**. Structure, classification and properties of carbohydrates
- **Topic 4.** Carbohydrate metabolism 1: Glycolysis
- **Topic 5**. Carbohydrate metabolism 2: Krebs cycle and oxidative phosphorylation
- **Topic 6**. Glycogen metabolism

LEARNING UNIT 3. Structure and function of fats

- **Topic 7**. Structure, classification and properties of fats
- **Topic 8.** Fatty acid metabolism: Biosynthesis and beta oxidation of fatty acids
- **Topic 9.** Regulation of lipid metabolism

LEARNING UNIT 4. Nucleotide metabolism

- **Topic 10.** Structure, properties and function of nucleotides
- **Topic 11.** Biosynthesis and degradation of nucleotides

LEARNING UNIT 5. Amino acid metabolism

- **Topic 12**. Structure and properties of amino acids
- **Topic 13**. Amino acid metabolism

LEARNING UNIT 6. Metabolic integration

- **Topic 14.** Metabolic integration in different states of nutrition

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

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

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	50
Independent working	37
Problem-solving	13
Debates and discussions	4
Workshops and/or lab work	18
Public spoken defence of work	7
Tutorials	14

Knowledge test	7
TOTAL	**150**

Blended:

Learning activity	Number of hours
Reading of content	13
Online seminars	7
Independent working	45
Problem-solving	17
Debates and discussions	23
Workshops and/or lab work	18
Online tutorials	20
Knowledge test	7
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
Knowledge tests	50%
Laboratory work	20%
Learning portfolio	20%
Performance observation	10%

Blended:

Assessment method	Weighting
Knowledge tests	50%
Laboratory work	20%
Learning portfolio	20%
Performance observation	10%

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 reference work for following this subject area is:

- Mathews y Van Holde. Bioquímica. McGraw-Hill. Interamericana, 3ª ed. 2008.
- Stryer, Berg y Tymoczko. Bioquímica. Editorial Reverté, S.A. 5ª ed. 2014.
- Voet D, Voet JG, Pratt CW. Fundamentos de Bioquímica. La vida a nivel molecular. Ed. Panamericana, 4ª ed. 2016.
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- Lieberman M, Marks A, Peet A. Bioquímica médica básica: un enfoque clínico. Wolters Kluwer-Lippincott Williams & Wilkins. Philadelphia. 2012
- Tratado de Nutrición. Tomo I: Bases fisiológicas y bioquímicas de la Nutrición. Ángel Gil. Ed. Panamericana, S.A. 3ª Edición, 2017. © 2017.https://descubre-uem.bibliocrai.universidadeuropea.es/cgi-bin/koha/opac-search.pl?idx=kw&q=bioquimica&sort_by=relevance_dsc&limit=location:mae
- Tratado de Nutrición. Tomo II: Bases moleculares de la nutrición. Angel Gil ed. Ed. Panamericana, S.A. 3ª Edición, 2017.
- Tratado de Nutrición. Tomo III: Composición y calidad nutritiva de los alimentos. Ángel Gil. Ed. Panamericana, S.A. 3ª Edición, 2017.
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- Libro blanco de la Nutrición en España. FEN. 2013
- Fundamentos de Nutrición y Dietética: Bases metodológicas y aplicaciones. Alfredo Martínez Hernández, María del Puy Portillo Baquedano. Ed. Panamericana, S.A. Edición, 2018.

Apps for mobile and tablet devices:

https://itunes.apple.com/us/app/case-files-biochemistry-3/id955265985?mt=8
https://itunes.apple.com/es/app/biochemistry-genetics-lange/id915478575?mt=8