



## 1. General information

Course: BIOCHEMISTRY

Type: BASIC

Degree: 383 - UNDERGRADUATE DEGREE PROGRAMME IN FOOD SCIENCE AND TECHNOLOGY

Center: 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY

Year: 2

Main language: Spanish

Use of additional languages:

Web site:

Code: 58309

ECTS credits: 9

Academic year: 2023-24

Group(s): 22

Duration: AN

Second language: English

English Friendly: Y

Bilingual: N

Lecturer: NILDA DEL CARMEN GALLARDO ALPIZAR - Group(s): 22

| Building/Office  | Department                    | Phone number | Email                  | Office hours |
|--|-------------------------------|--------------|------------------------|--------------|
| Facultad de Ciencias y Tecnologías Químicas. Lab Bioquímica. Ciudad Real | QUÍMICA INORG., ORG., Y BIOQ. | 6280         | nilda.gallardo@uclm.es |              |

Lecturer: LORENA MAZUECOS FERNÁNDEZ-PACHECO - Group(s): 22

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|                 | QUÍMICA INORG., ORG., Y BIOQ. |              | Lorena.Mazuecos@uclm.es |              |

Lecturer: MARGARITA VILLAR RAYO - Group(s): 22

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## 2. Pre-Requisites

In order to achieve the objectives of this subject, it is appropriate for the student to have knowledge and skills, prior and general, of biology and chemistry, to a university level. In particular, you should be familiar with cellular structure and function, and the energy transformations that take place in the living matter. It is also very convenient that you know the basics of chemical balance and kinetics of chemical reactions, and should have some foundations of thermodynamics. Knowing the basic work with solutions and working safely in a laboratory will be of great use to the student.

## 3. Justification in the curriculum, relation to other subjects and to the profession

This subject belongs to the basic content module of the Degree of Food Science and Technology. It is in the second year of the degree. Provides knowledge needed for higher course subjects, such as those related to nutrition and food biotechnology, and is supplemented by subjects of the same course, such as Structure and Properties of Food Components, Organic Compounds and their Characterization, or by Physiology and Microbiology, taught in the first course.

On the other hand, the subject of Biochemistry requires fundamentals acquired in the first course, especially in Biology and Chemistry, and will use tools provided by Physics and Mathematics.

Much of the current advances in food science are achieved with studies at the molecular level, both of the food itself and of organisms producing them or of consumers. Therefore, a solid understanding of biochemical fundamentals will help lay the groundwork necessary for the student to be able, in his future professional exercise, to understand and analyze the problems that arise in this field.

## 4. Degree competences achieved in this course

## Course competences

| Code | Description   |
|------|---|
| CB02 | Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.  |
| E02  | To acquire basic knowledge in biology, biochemistry, physiology and microbiology to allow the study of the nature of foods, causes of their alteration and fundamentals of their production, as well as their role in human nutrition and dietetics |
| G01  | To develop the aptitude to gather and interpret information and data to issue critical judgments that include a reflection on relevant topics of social, scientific or ethical nature.  |
| G02  | To possess a correct oral and written communication. To transmit information, ideas, problems and solutions to a both specialized and not specialized public.   |

## 5. Objectives or Learning Outcomes

### Course learning outcomes

#### Description

- Know how gene expression is regulated depending on the cellular and body needs
- Know various alterations of energy metabolism
- Know the structure of the main biomolecules.
- Identify the main metabolic reactions for synthesis and transformation of biomolecules.
- Know the basic mechanisms of metabolic regulation
- Be able to describe the molecular mechanism of DNA replication and transcription, as well as that of translation.
- Be able of explaining the specific functions of different organs in the whole metabolism
- Being able to carry out basic work with simple biological systems in the laboratory, and interpret experimental results.
- Being able to collect bibliographic data, present it orally and discuss it.

## 6. Units / Contents

### Unit 1: The water molecule in relation to biomolecules

### Unit 2: Biomolecules I: Carbohydrates

### Unit 3: Biomolecules II: Lipids

### Unit 4: Biomolecules III: Proteins

### Unit 5: Enzyme catalysis and its regulation

### Unit 6: Introduction to metabolism

### Unit 7: Metabolism of carbohydrates

### Unit 8: Metabolism of lipids

### Unit 9: Metabolism of nitrogenous compounds

### Unit 10: Integration and regulation of metabolism

### Unit 11: Expression and transmission of genetic information. Regulation of gene expression

## 7. Activities, Units/Modules and Methodology

| Training Activity                              | Methodology                      | Related Competences<br>(only degrees before RD<br>822/2021) | ECTS   | Hours      | As | Com | Description |
|--|----------------------------------|---|--|------------|----|-----|-------------|
| Class Attendance (theory) [ON-SITE]            | Lectures                         |   | 1.9  | 47.5       | Y  | N   |             |
| Laboratory practice or sessions [ON-SITE]      | Practical or hands-on activities |   | 0.6  | 15         | Y  | Y   |             |
| Workshops or seminars [ON-SITE]                | Workshops and Seminars           |   | 0.9  | 22.5       | Y  | N   |             |
| Writing of reports or projects [OFF-SITE]      | Guided or supervised work        |   | 3.3  | 82.5       | Y  | Y   |             |
| Study and Exam Preparation [OFF-SITE]          | Self-study                       |   | 1.9  | 47.5       | Y  | N   |             |
| Group tutoring sessions [ON-SITE]              | Group tutoring sessions          |   | 0.2  | 5          | Y  | N   |             |
| Mid-term test [ON-SITE]                        | Assessment tests                 |   | 0.2  | 5          | Y  | N   |             |
| <b>Total:</b>                                  |                                  |   | <b>9</b>                                     | <b>225</b> |    |     |             |
| <b>Total credits of in-class work: 3.8</b>     |                                  |   | <b>Total class time hours: 95</b>            |            |    |     |             |
| <b>Total credits of out of class work: 5.2</b> |                                  |   | <b>Total hours of out of class work: 130</b> |            |    |     |             |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

## 8. Evaluation criteria and Grading System

| Evaluation System                                 | Continuous assessment | Non-continuous evaluation* | Description |
|---|-----------------------|----------------------------|-------------|
| Assessment of problem solving and/or case studies | 25.00%                | 25.00%                     |             |
| Theoretical papers assessment                     | 10.00%                | 10.00%                     |             |
| Mid-term tests                                    | 55.00%                | 0.00%                      |             |
| Final test  | 10.00%                | 65.00%                     |             |
| <b>Total:</b>                                     | <b>100.00%</b>        | <b>100.00%</b>             |             |

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

### Evaluation criteria for the final exam:

#### Continuous assessment:

Based on minimal knowledge of Biochemistry terminology and on basic concepts, mainly the ability to relate data and processes, reasoning capacity and synthesis capacity will be assessed in all evaluation exercises conducted throughout the course.

To average different tests, a minimum of 4 out of 10 in any of the evaluated items will be required, although to pass the subject, the student must obtain a minimum global grade of 5 out of 10.

#### Non-continuous evaluation:

In the case of choosing the non-continuous evaluation, the students will take a single final test that will evaluate 100% of the skills, including, in addition to

the theoretical content, the practice test and the resolution of problems or cases.

To average different tests, a minimum of 4 out of 10 in any of the evaluated items will be required, although to pass the subject, the student must obtain a minimum global grade of 5 out of 10.

**Specifications for the resit/retake exam:**

The evaluation criteria of the final exam will be maintained.

The student who has obtained, at least, a grade of 4 out of 10, in the tests carried out in the final exam, may choose to maintain the grade obtained or re-evaluate its contents, although only it will be understood that the subject has been passed if the student has obtained a minimum average of 5 out of 10 in the global average.

**Specifications for the second resit / retake exam:**

The same for the first resit/retake exam.

| 9. Assignments, course calendar and important dates  |       |
|--|-------|
| Not related to the syllabus/contents   |       |
| Hours  | hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]   | 47.5  |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]   | 15    |
| Workshops or seminars [PRESENCIAL][Workshops and Seminars]   | 17.5  |
| Writing of reports or projects [AUTÓNOMA][Guided or supervised work]   | 82.5  |
| Study and Exam Preparation [AUTÓNOMA][Self-study]  | 47.5  |
| Group tutoring sessions [PRESENCIAL][Group tutoring sessions]  | 5     |
| Mid-term test [PRESENCIAL][Assessment tests]   | 5     |
| <b>General comments about the planning:</b> Laboratory practices will be adapted, depending on the restrictions imposed by the regulations related to covid-19 at the time of their completion. In the case of the number of laboratory hours reduced, these will be replaced by other activities. |       |
| Global activity  |       |
| Activities   | hours |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]   | 15    |
| Workshops or seminars [PRESENCIAL][Workshops and Seminars]   | 17.5  |
| Writing of reports or projects [AUTÓNOMA][Guided or supervised work]   | 82.5  |
| Study and Exam Preparation [AUTÓNOMA][Self-study]  | 47.5  |
| Mid-term test [PRESENCIAL][Assessment tests]   | 5     |
| Class Attendance (theory) [PRESENCIAL][Lectures]   | 47.5  |
| Group tutoring sessions [PRESENCIAL][Group tutoring sessions]  | 5     |
| <b>Total horas: 220</b>  |       |

| 10. Bibliography and Sources                                      |  |                               |              |                   |      |             |
|---|--|-------------------------------|--------------|-------------------|------|-------------|
| Author(s)   | Title/Link   | Publishing house              | City         | ISBN              | Year | Description |
| Berg J.M., Tymoczko, J.L., Stryer L                               | Bioquímica   | Editorial Reverté             | Barcelona    | 978-84-291-76025  | 2013 |             |
| Gil Hernández (editor), Sánchez de Medina F. (coeditor)           | Tratado de nutrición. Tomo I: Bases fisiológicas y bioquímicas de la nutrición | Editorial Médica Panamericana | Madrid       | 9788498353495     | 2010 |             |
| Mathews C.K. , van Holde K.E., Appling D.R. y Anthony-Cahill S.J. | Bioquímica   | Pearson Educación, S.A.       | Madrid       | 9788490353851     | 2013 |             |
| Nelson D.L., Cox M.M.   | Lehninger Principios de Bioquímica   | Ediciones Omega               | Barcelona    | 978-84-282-1486-5 | 2009 |             |
| Voet D. y Voet J.G.   | Bioquímica   | Ed. Médica Panamericana       | Buenos Aires | 950-06-2301-3     | 2006 |             |
| Voet D., Voet J.G. y Pratt C.W.                                   | Fundamentos de Bioquímica  | Ed. Médica Panamericana       | Buenos Aires | 978-950-06-2314-8 | 2007 |             |
| Feduchi E., Romero C., Yáñez E. y García-Hoz, C.                  | Bioquímica. Conceptos esenciales. 3ª Ed.                                       | Ed. Médica Panamericana       |              | 978-84-9110-680-7 | 2021 |             |