



# **COURSE GUIDE**

## **STAGES 1, 2 AND 3:**

### **BIOLOGY**

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**FACULTAD DE CIENCIAS QUÍMICAS**  
**UNIVERSIDAD COMPLUTENSE DE MADRID**  
**Academic year 2020-2021**



## STAGE 1. PRESENCE-BASED MODALITY

### I.- IDENTIFICATION

<b>COURSE NAME:</b>	<b>Biology</b>
<b>CREDITS (ECTS):</b>	<b>6</b>
<b>CHARACTER:</b>	<b>Mandatory</b>
<b>SUBJECT/ TOPIC:</b>	<b>Biology</b>
<b>MODULE</b>	<b>Basic</b>
<b>DEGREE:</b>	<b>Bachelor in Chemistry</b>
<b>SEMESTER/ TERM:</b>	<b>1<sup>st</sup> (1<sup>st</sup> Year)</b>
<b>DEPARTAMENT:</b>	<b>Biochemistry and Molecular Biology</b>

#### LECTURERS:

Group D		
<b>Lectures Seminars Tutorials</b>	<b>Lecturer:</b>	CRISTINA SÁNCHEZ GARCÍA
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<b>Lectures Seminars Tutorials</b>	<b>Lecturer:</b>	JAVIER PALAZUELOS DIEGO
	<b>Department:</b>	Biochemistry and Molecular Biology
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### II.- OBJECTIVES

#### ■ GENERAL OBJECTIVE

Introductory course focused on the study of biological chemistry. The main objective of this course is to establish the basic knowledge about the nature of living organisms.

#### ■ SPECIFIC OBJECTIVES

To provide the basic knowledge on biological systems and to introduce the molecular and cellular fundamentals of living organisms.

To understand the different types of living organisms and the basic differences in their development and organization.

To provide insights into the basic cellular and tissue functions.

To understand the basics of molecular and classic genetics.

To interpret the relationship between living organisms and the environment.



### III.- PREVIOUS KNOWLEDGE AND RECOMMENDATIONS

#### ■ PREVIOUS KNOWLEDGE:

#### ■ RECOMMENDATIONS:

Completed studies in Biology and Chemistry are recommended.

### IV.- CONTENTS

#### ■ BRIEF DESCRIPTION

Structure and function of chemical molecules on biological systems. Basic cellular structures. Physiological activities of membranes. Metabolic pathways and mechanisms of energy production. Basics in molecular and classic genetics. Molecular processes of evolution. Multicellular organization. Biogeochemical cycles and its relation to the environment.

#### ■ SYLLABUS:

##### **UNIT 1: Structure and function of biological molecules**

Relevance of water in life. Structure and function of carbohydrates, proteins, lipids and nucleic acids.

##### **UNIT 2: Structure and metabolism of the cell**

Structure and function of subcellular organelles. Main metabolic pathways. Mechanisms of energy production. Regulatory mechanisms. Cytoskeleton's function.

##### **UNIT 3: Molecular basis of genetic information**

Cellular mechanisms of genetic transmission. Nucleic acids replication and transcription. Fundamental concepts of Mendelian genetics.

##### **UNIT 4: Reproduction, development and evolution mechanisms**

Reproduction in the different living organisms: prokaryotes, eukaryotes and viruses. Evolution of physical systems of complex structures.

##### **UNIT 5: Biogeochemical cycles and environmental relationships**

Biogeochemical cycles and environmental mutagenesis. Molecular processes of evolution.



## V.- COMPETENCES

### ■ GENERAL:

- **CG1:** To recognize the biological processes in the daily life.
- **CG2:** To recognize the relevance of Biology in several contexts, and its relation to other areas of knowledge.

### ■ SPECIFIC:

- **CE19-B1:** To describe the main types of living organisms and the basic differences associated with its formation, organization, functions and level of complexity.
- **CE19-B2:** To formulate the basic biological concepts and to develop an integrated vision of the cell from a morphologic and functional perspective.
- **CE19-B3:** To recognize and explain the basic cellular and tissue functions of living organisms, and the molecular organization of the cell from an energetic and functional point of view.
- **CE19-B4:** To interpret images of tissues, cells and cellular organelles.

### ■ GENERIC:

- **CT1:** To elaborate and write scientific and technical reports.
- **CT2:** To cooperate with other students through team work.
- **CT3:** To demonstrate critical reasoning.
- **CT4:** To be able to adapt to new situations.
- **CT11:** To develop work autonomously.
- **CT12:** To develop sensitivity to energetic and environmental topics.

## VI. – LEARNING OUTCOMES

Check the Spanish version. Guía Docente, Biología. Grado en Química.



## VII. – WORKING HOURS DISTRIBUTED BY ACTIVITIES

Activity	Attendance (hours)	Self Study (hours)	Credits (Hours)
Lectures	38	62	4 (100)
Seminars	7	13	0.8 (20)
Tutorials / Guided work	2	6	0.3 (8)
Exam Preparation	5	17	0.9 (22)
<b>Total</b>	<b>52</b>	<b>98</b>	<b>6</b>

## VIII.- METHODOLOGY

The theoretical classes will be taught to the entire group. During these classes the student will be informed about the content of the subject. At the beginning of each subject the basic concepts and main objectives will be explained in a reasoned manner. At the end of the topic a brief summary of the most relevant aspects will be carried out, and new objectives will be proposed that will allow to interrelate contents already studied with those of the rest of the subject and other related subjects. To facilitate the follow-up work of the student in the classroom, the teaching material used by the teacher will be provided, either in paper or through the Virtual Campus.

Periodically, the student will be provided with a list of exercises and cases to be solved before the seminars. In some cases, the student will present the results of those exercises or cases to the class for discussion of his interpretation and biological significance. In other cases, the results obtained by the students will be discussed in the classroom and, subsequently, they will make a final presentation to the class. Finally, some exercises will be collected by the teacher for evaluation.

Short exams can be made, or questions raised to assess the evolution of students and the degree of achievement of knowledge they acquire.

To control in an objective way the personal work carried out by the student, and to promote the development of autonomous work, a series of directed activities will be proposed. Each group of students will prepare and present in class short works on selected contents of the Biology subject. All this will allow the student to put into practice their skills in obtaining information.

The lecturer will schedule directed tutoring with individual students or small groups of students, on questions raised by the students or by the lecturer. These tutoring activities can be done face-to-face or virtually.



## IX.- BIBLIOGRAPHY

### ■ BASIC:

- Curtis, H.: “*Biología*” 7<sup>a</sup> ed., Panamericana, 2012.
- Curtis, H., Barnes Schnek y Massarini: “*Invitación a la Biología en contexto social*” 7<sup>a</sup> ed., Panamericana, 2012.
- Solomon, E.P.; Berg, L.R.; Martin, D.W.: “*Biology*”, 10<sup>th</sup> ed., McGraw-Hill, 2014.
- Campbell, N.; Reece, J.: “*Biology*”. Editorial Panamericana (10<sup>th</sup> ed.) 2014.
- Freeman, S.; Quillin, K; Allison, L.: “*Biological Science*”. Editorial Pearson (5<sup>th</sup> ed.), 2016.

### ■ COMPLEMENTARY:

- Tymoczko, M. Berg y L. Stryer: “*Biochemistry*”. Editorial Reverté (8<sup>th</sup> ed.), 2015.
- Alberts, B.: “*Essential cell biology*”, Editorial Médica Panamericana (3<sup>rd</sup> ed.), 2011.
- Lodish, H y col. “*Biología Celular y Molecular*” Editorial Médica Panamericana (7<sup>a</sup> ed., 2016
- E. Feduchi, I. Blasco, C.S.Romero y E. Yáñez: “*Bioquímica. Conceptos esenciales*” Editorial Médica Panamericana (2<sup>a</sup> ed., 2014.

## X.- ASSESSMENT PROCEDURE

The final evaluation requires the participation in at least 70% of the personal work and directed activities, and to obtain a minimum mark of 4/10 in the exam. This evaluation procedure will be used in June and July calls. The final mark will be calculated according to the following percentages:

### ■ WRITTEN EXAM:

**75%**

The assessment of the acquired competences in the theoretical part will be carried out by a single final exam. The exam will account for 75% of the final mark. It is mandatory to obtain a minimum mark of 4/10 in the exam to have access to the final mark.

### ■ PERSONAL WORK:

**10%**

The assessment of the personal work will be carried out through tutoring. The assessment of the learning work carried out by the student will consider the student's ability to solve the problems and exercises proposed, in the preparation of a report, and potential writing tests of the explained topics.

**■ DIRECTED ACTIVITIES:****10%**

The students will organize in a small groups and will present to the classroom a work among those proposed by the teacher. After the presentation, each group will reply the questions on the subject of their classmates and teacher. The teacher will evaluate the clarity in the presentation and in the answers.

**■ ATTENDANCE AND PARTICIPATION:****5%**

The attendance and participation in all activities will be evaluated in the final mark. The continuous failure in attendance could be penalize.

The qualifications of the activities planned for the evaluation of the Biology subject (controls, tutoring, presentations, etc.) will be communicated to the students sufficiently in advance of the final exam, so that they can plan the study properly.

The minimum period of seven days between the publication of the marks and the date of the final exam of the subject will be respected.



## ACTIVITIES SCHEDULE

UNIT	ACTIVITY	HOURS	START	END
1. Structure and function of biological molecules	Lectures	9	1 <sup>st</sup> week	3 <sup>rd</sup> week
	Seminars	1	1 <sup>st</sup> week	3 <sup>rd</sup> week
2. Structure and metabolism of the cell	Lectures	10.5	4 <sup>th</sup> week	7 <sup>th</sup> week
	Seminars	2.5	4 <sup>th</sup> week	7 <sup>th</sup> week
	Tutorials	1	5 <sup>th</sup> week	5 <sup>th</sup> week
3. Molecular basis of genetic information	Lectures	8.5	8 <sup>th</sup> week	10 <sup>th</sup> week
	Seminars	1.5	8 <sup>th</sup> week	10 <sup>th</sup> week
	Tutorials	1	12 <sup>th</sup> week	12 <sup>th</sup> week
4. Reproduction, development and evolution mechanisms	Lectures	5	11 <sup>th</sup> week	12 <sup>th</sup> week
	Seminars	1	11 <sup>th</sup> week	12 <sup>th</sup> week
5. Biogeochemical cycles and environmental relationships	Lectures	5	13 <sup>th</sup> week	14 <sup>th</sup> week
	Seminars	1	13 <sup>th</sup> week	14 <sup>th</sup> week
OTHER ACTIVITIES		HOURS		
Exam		3	Determined by the School	





## SUMMARY OF ACTIVITIES

Teaching activity	Associated competences	Lecturer activity	Student activity	Assessment procedure	P	NP	Total	C
Lectures	CG1, CG2, CG3, CE19-B1, CE19B2, CE19-B3, CT3, CT5, CT11, CT12.	Presentation of theoretical concepts and approach of questions and new proposals	Taking notes. Resolution of questions. Development of the new proposals. Formulation of questions and doubts.	Assessment of the answers given to questions related to theoretical concepts.	38	62	100	15%
Seminars	CG1, CG2, CG3, CE19-B1, CE19B2, CE19-B3, CE22-B1, CT3, CT5, CT11, CT12.	Application of the theory to the resolution of exercises and problems. Presentation of relevant and current topics	Taking notes. Resolution of exercises and questions. Formulation of questions and doubts.	Assessment of the answers (approach and result) given for the resolution of practical exercises and numerical problems.	7	13	20	
Tutorials	CG1, CG2, CG3, CE19-B1, CE19B2, CE19-B3, CE22-B1, CT3, CT5, CT11, CT12.	Direction and supervision of the study and activities of the students. Raise questions.	Discussing with the lecturer concept and methodological difficulties. Answering the proposed questions.		2	6	8	
Guided activities	CG1, CG2, CG3, CE19-B1, CE19B2, CE19-B3, CE22-B1, CT3, CT5, CT11, CT12.	Proposal and critical evaluation of assignments.	Team work. Critical opinion of the oral presentations of other students.	Assessment of the in-group written assignment, the analyses carried out.	2	7	9	10%
Examinations	CG1, CG2, CG3, CG9, CG12, CE19-B1, CE19B2, CE19-B3, CE22-B1, CT3, CT5, CT11, CT12.	Exam design, surveillance and correction. Evaluation of the student.	Exam preparation and examination	Exam marking.	3	10	13	75%

P: In-class; NP: Self-study; C: Evaluation

## STAGE 2. BLENDED MODALITY

## VIII.- METHODOLOGY

- Theoretical classes and seminars will be given by the teacher in the usual way, as in Stage 1, and with the same content. According to the principle of *maximum attendance* approved by the Rector of the UCM, the session will be followed by the students in the classroom, up to full capacity considering social distance. Students located in classrooms with cameras, and that do not fit in the classroom, will follow the session virtually, either from their homes or in the public areas provided by the Faculty for this purpose, which will be duly advertised in the CV. For classrooms that do not have a camera, a rotating shift of students in the classroom will be established, according to the numbering of the ID card. This procedure may be modified by the professor throughout the course, as he considers appropriate, to adjust the capacity of the classroom with the students attending his class.
  - The teaching material used will be the class presentations enabled in the UCM Virtual Campus also used in Stage 1, as well as videos related to the subject and other types of materials that the subject's teachers consider relevant and interesting. All the material will be available to students through the Virtual Campus for their use.
  - The telematic means used for students without presence in the classroom to virtually follow the sessions will be the platforms: Collaborate available in the CV, Google Meet, Microsoft Teams or Zoom. The teacher will keep a session of this type open in order to maintain a direct and fluid relationship with the students who attend virtually, thus being able to simultaneously project the presentation in POWERPOINT and follow the traditional explanations given on the blackboard.
- **Individual Tutorials.**

They will be carried out by video conference and/or e-mail.
- **Monitoring of the students**

In the teaching part that is carried out in presence, the same techniques used in a traditional way will be followed.

In the virtual teaching part, the monitoring will be carried out by different techniques, according to the teacher's opinion: using the tool to record the activities of each session (Collaborate), the name of the attendees (Google Meet), analysis of the downloads made by the students in the CV, etc.

**X.- ASSESSMENT PROCEDURE**

Face-to-face examinations will be carried out using the procedure described in Stage 1.

## STAGE 3. VIRTUAL MODALITY

## VIII.- METHODOLOGY

- **Theoretical classes and seminar** that will be given in combined sessions: (a) synchronous, at the established official time and (b) asynchronous.
  - The teaching material used will be the class presentations enabled in the UCM Virtual Campus, also used in Stages 1 and 2, PowerPoint presentations accompanied by voice recordings where the necessary explanations are included as if it were a face-to-face class, as well as videos related to the subject and other types of material that the professors of the subject consider relevant and interesting. As in the previous scenarios, all the material will be available to students through the Virtual Campus for their use.
  - The telematic means used will be the platforms already mentioned in Stage 2: Collaborate available in the CV, Google Meet, Microsoft Teams or Zoom.
- **Individual tutorials** will be carried out as in Stage 2.
- **Monitoring of the students**

This will be done in the same way as described in Stage 2 for virtual teaching.

## X.- ASSESSMENT PROCEDURE

## DESCRIPTION OF THE ASSESSMENT PROTOCOL

- **Student identification:**

The identification of students taking the exam will be done through: (i) entry to the virtual campus to view the exam statements, which is recorded through their identification with username and password, (ii) video image through Google Meet or Collaborate (from the computer camera or mobile), and (iii) possible telematic check throughout the exam by the teacher.
- **Type of exam:**

The virtual exam will be carried out through different types of questionnaires and/or tasks, using the different tools offered by the virtual campus.
- **Monitoring of students during the test:**

It will be carried out using one or more of the tools offered by the Moodle platform on which the virtual campus is based; namely, synchronous connection with the students, either through the open connection of Collaborate, or through the open connection of Chat, or connection with the students through the messages (not emails) of Moodle, as well as the monitoring of the correct development of the test through the activity records of the Questionnaires made possible by the Moodle platform.

- **Review of exams:**

This will be carried out preferably through the synchronous communication tools by audiovisual means that the Moodle platform on which the virtual campus is based allows, after arranging for a non-presential review with the student who has requested it.

- **Mechanism used for the documentation/recording of assessment tests for subsequent viewing and evidence:**

The evidence of the exams, taken through the different possibilities offered by the virtual campus, are stored in the application itself, and the documents that collect the answers of the students can be visualized and reviewed when necessary. In addition, if deemed appropriate, it will be possible to record the exam session, with the limitations established by the UCM, for later review if necessary. This recording, if made, will be stored with the necessary security measures on UCM equipment and will be deleted after the review time. In general, the guidelines for the information collected at <https://quimicas.ucm.es/informacion-en-relacion-al-coronavirus> will also be followed.