



## IDENTIFYING DATA

### Biology: Biology

Subject	Biology: Biology			
Code	V11G201V01101			
Study programme	(*)Grao en Química			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Spanish			
Department				
Coordinator	Arenas Busto, Miguel			
Lecturers	Arenas Busto, Miguel			
E-mail	marenas@uvigo.es			
Web	<a href="http://cme.webs.uvigo.es">http://cme.webs.uvigo.es</a>			
General description	The matter of Biology has like aim the preparation of the studens to comprise and explain better the living beings, as they are constituted and as they work, as they study , as they contrast the hypotheses and the experimental facts to elaborate the biological theories.			

## Competencies

Code	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
B1	Autonomous learning ability
B3	Ability to manage information
C20	Know the structure and reactivity of the main classes of biomolecules and the chemistry of important biological processes
D1	Ability to solve problems

## Learning outcomes

Expected results from this subject	Training and Learning Results			
Interpret the cell as a fundamental unit in the living beings.	A1	B1 B3	C20	D1
Describe the cellular structure in prokaryotes and eukaryotes.	A1	B1 B3	C20	D1
Differentiate the properties, organisation and function of the distinct cellular organelles.	A1	B1 B3	C20	D1
Associate the cellular structures with the metabolism.	A1	B1 B3	C20	D1
Identify and relate the metabolic routes of the distinct organic molecules.	A1	B1 B3	C20	D1
Recognise the structure and function of the hereditary material and interpret the principles of the central dogma.	A1	B1 B3	C20	D1
Discuss the process of mutation and its implication in the evolutionary processes.	A1	B1 B3	C20	D1
Differentiate the technicians of recombinant DNA.	A1	B1 B3	C20	D1
Interpret the importance of the immune system.	A1	B1 B3	C20	D1

## Contents

Topic
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1. The cell.	Size, form and cellular function. Cell classification. Cell Theory. Prokaryotic cell and eukaryotic cell.
2. Biomembranes and systems of cellular transport.	Cell membrane: functions, biochemical composition, physico-chemical properties. Synthesis of the cellular membrane. System of transport through the biological membranes: pumps, protein transporters and channels.
3. The core and the chromosomes. The cellular organelles.	Cell nucleus: structure, composition and functions. Structure and functions of the nucleolus. Structures and functions of chromatin and chromosomes. Structure, composition and functions of: matrix extracellular, cytoskeleton and centrioles, endoplasmic reticulum, apparatus of Golgi, endosomes and lysosomes, mitochondria, peroxisomes and chloroplasts.
4. Cellular division and cellular cycle.	Definition and characteristics of mitosis. Differences between somatic and germinal cells. Phases of the cellular cycle. Biological meaning of mitosis. Concept of the apoptosis, cellular proliferation and cancer. Concept and differences between asexual and sexual reproduction. Definition and characteristic of meiosis. Phases of meiosis. Origin of the genetic variability of the meiosis. Differences between mitosis and meiosis.
5. General design of the metabolism: catabolism and anabolism.	Concept of: enzyme, energetic metabolism, metabolic route, catabolism, anabolism. The equivalent of ATP. Extraction of the chemical energy of the organic compounds: glucides, lipids and proteins.
6. Photosynthesis.	Nature of the light. Photosynthetic pigments. Stages of the photosynthesis: luminous phase and dark phase (cycle of Calvin). The problem of the photorespiration: plants C4 and plants CAM.
7. DNA, structure and function.	Composition, structure of the DNA. Function of the DNA. Replication of the DNA. Initiation the techniques of the recombinant DNA.
8. RNA and the expression of the genetic message.	Composition and structure of the RNA. mRNA, tRNA and rRNA. Other types cellular RNAs and its functions. Review of the concepts of transcription and translation. Language of the genetic information.
9. Mutation and evolution.	Genetic mutations: concept and types. Molecular consequences of the genetic mutations. Structural chromosomal mutations. Numerical chromosomal mutations. Origin and consequences of the mutations. Relation of the mutations and cancer. Evolutionary theories. Arguments in favour of evolution.
10. The immune system.	Concept of immune system. Components of the immune system. Mechanism of the innate defence of the immune system. Antibodies and interferon. Types of immune response. Alterations of the immune system. Importance of the vaccines.

## Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	26	52	78
Problem solving	13	26	39
Mentored work	0	23	23
Essay questions exam	2	8	10

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

<b>Methodologies</b>	
	Description
Lecturing	In these classes the professor will explain and will develop the concepts and basic foundations of the contents in a clear way to facilitate its understanding. The contents for each topic will be exposed in the platform TEMA with sufficient time so that the students can consult them. It is recommended that the student works on this material, also consulting the bibliography recommended.
Problem solving	These classes include the following appearances. a) Each student will perform a series of exercises to understand the topics. These exercises will be considered for the evaluation. b) Explanations of doubts of the previously explained concepts in Lecture classes. c) The students separately or in group will make illustrative pictures of the subjects analysed in the Lecture classes to have an overview of the contents, what will facilitate the understanding and interrelationships. d) In this section we will work on some concepts that by experience are more difficult to understand and so that require a greater didactic support. e) If necessary these classes will also be used for the presentation of works.
Mentored work	Performance (research of information, preparation and presentation) of a work in group. The works will be related with the fields of the biotechnology, cellular biology, molecular biology, genetics and immunology and will be proposed by the professor. The professor could contribute part of the necessary information for this execution. The work will be considered for the evaluation.

### **Personalized assistance**

<b>Methodologies</b>	<b>Description</b>
Mentored work	Discussion and solving of questions, exercises and problems related with the subject. Each student will ask the professor the explanations that estimate timely to comprise better the subject and develop successfully the tasks that were proposed. These queries will be attended in schedule of personalized sessions.
Problem solving	Discussion and solving of questions, exercises and problems related with the subject. Each student will ask the professor the explanations that estimate timely to comprise better the subject and develop successfully the tasks that were proposed. These queries will be attended in schedule of personalized sessions.

### **Assessment**

	Description	Qualification	Training and Learning Results
Problem solving	The resolution by the students of a series of problems and / or exercises as academic follow-up of the student will be assessed. The final grade of these exercises will be 10% of the final grade.	10	A1 B1 C20 D1 B3
Mentored work	The structuring and organization of the contents, the complexity of the work, the oral presentation and the sources consulted will be evaluated. These works will be exposed in the seminar sessions to the rest of the classmates. The final grade of these works will be 10% of the final grade.	10	A1 B1 C20 B3
Essay questions exam	There will be a mid-course (20%) test and another test at the end of the course (final with the whole subject, 50%) on the subject explained in the lectures and seminars. It will consist mainly of short answer questions, although it could include some long answer questions. Said tests will represent 70% (20%, 50%) of the final grade.	80	A1 B1 C20 D1 B3

### **Other comments on the Evaluation**

The student who takes the final evaluation test will be considered as presented.

The final grade of the subject will be given by the weighted average of the three sections of the evaluation. In this way, to pass the subject, said weighted average must be equal to or higher than 5.0.

In the second call, the evaluation will be carried out by any of the following two options (the student will be evaluated with that one to obtain the highest score):

1. The score reached by the student during the course in the supervised works and seminars will be conserved (32% of the final grade). None of these sections is recoverable. An analogous test will be carried out at the end of the semester. This test will be equivalent to 80% of the final grade.

2. An analogous test will be carried out at the end of the semester. This test will be equivalent to 100% of the final grade.

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## Sources of information

### Basic Bibliography

John Kimball, <http://biology-pages.info/>,

Bruce Alberts, Dennis Bray, Karel Hopkin, Alexander Johnson, Julian Lewis, Martin Raff, Keith Robert, **Introducción a la Biología Celular**, Tercera Edición, 2011,

Peter J Rusell, **iGenetics. A molecular approach**, Third Edition, 2010,

Leonardo Fainboin, Jorge Geffner, **Introducción a la Inmunología Humana**, Sexta Edición, 2011,

James D. Watson, **Biología Molecular del gen**, Séptima edición, 2016,

Christopher Mathews, K. E. van Holde, **Bioquímica**, Segunda edición,

### Complementary Bibliography

Helmut Plattner, Joachim Hentschal, **Biología Celular**, Cuarta Edición, 2014,

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## Recommendations

### Subjects that are recommended to be taken simultaneously

Physics: Physics I/V11G201V01102

Mathematics: Mathematics 1/V11G201V01103

Chemistry: Chemistry 1/V11G201V01104

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## Other comments

It is recommended to have done the subject "Biology" of the 2<sup>o</sup> course of Bachillerato.

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## Contingency plan

### Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

\* Teaching methodologies maintained

All teaching methodologies (master class, problem solving and supervised work) are maintained, but will be carried out in a totally non-presential (virtual) way using the Remote Campus and Faitic.

\* Teaching methodologies modified

All teaching methodologies (master class, problem solving and supervised work) are maintained, but will be carried out in a totally non-presential (virtual) way using the Remote Campus and Faitic.

\* Non-attendance mechanisms for student attention (tutoring)

The tutoring is carried out in a totally non-presential (virtual) using the Remote Campus and Faitic.

\* Modifications (if applicable) of the contents

The contents will not be modified.

\* Additional bibliography to facilitate self-learning

No additional bibliography is required to that already included in the corresponding section.

\* Other modifications

None.

=== ADAPTATION OF THE TESTS ===

\* Tests already carried out

The tests and their weights are maintained, they will only be carried out with a virtual procedure instead of a presential procedure.

\* Pending tests that are maintained

The tests and their weights are maintained, they will only be carried out with a virtual procedure instead of a presential procedure.

\* Tests that are modified

No more neither less tests will be carried out than those included in the corresponding section. They will only be carried out with a virtual procedure instead of a presential procedure.

\* New tests

No more neither less tests will be carried out than those included in the corresponding section. They will only be carried out with a virtual procedure instead of a presential procedure.

\* Additional Information

The tests and their weights are maintained, they will only be carried out with a virtual procedure instead of a presential procedure.

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