



IDENTIFYING DATA

Technics in cellular and molecular biology

Subject	Technics in cellular and molecular biology			
Code	V02G031V01310			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	2nd
Teaching language	Spanish			
Department				
Coordinator	de Carlos Villamarín, Alejandro Leonides			
Lecturers	de Carlos Villamarín, Alejandro Leonides Galindo Dasilva, Juan Magadán Mompo, Susana Miguel Villegas, Encarnación de Morán Martínez, María Paloma Simón Vázquez, Rosana			
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Web				

General description This is an eminently practical subject whose mission is the acquisition of experience in the use of advanced molecular, cellular and histological techniques. It is intended to show the possibilities of such techniques and to complete and extend the knowledge acquired by students in the basic laboratory techniques of the first year of the degree and in the laboratory practices of the second year of the degree. For this purpose, different experimental protocols will be performed in the laboratory, which are considered as advanced because of their technical and conceptual level. The different techniques will be grouped in modules according to their relation with different areas of Biology. The teaching method is mainly based on laboratory work, but also incorporates complementary readings and tools to achieve an integration of the knowledge of the different areas and to be able to apply them to the resolution of an experimental problem from different technical points of view. The schedules of the course and exam dates can be consulted in the official links of the faculty's web page.

Translated with DeepL.com (free version)

Training and Learning Results

Code	
A1	Students should prove understanding and knowledge in this study field that starts in the Secondary Education and with a level that, even though it is supported in advanced books, also includes some aspects that involve knowledge from the vanguard of the study field.
A2	Students should know how to apply their knowledge to their work or vocation in a professional way. They also should have the competences that are usually proved through the elaboration and defence of arguments and the resolution of problems within their study field.
A3	Students should prove ability for information-gathering and interpret important data (usually within their study field) to judge relevant social, scientific or ethical topics.
B2	Manage scientific-technical information using diverse and reliable sources. Analyze data and documents and interpret them critically and rigorously, including considerations on their social relevance and in the professional field of Biology.
B4	Draft and write reports, documents and projects related to Biology. Proceed to their presentation and debate in the teaching and specialized areas, highlighting the competences of the degree.
C2	Identify levels of organisation of living beings through the study of current specimens and fossils. Carry out phylogenetic analyses and study the mechanisms of heredity, evolution and biodiversity.
C4	Isolate, identify and growth microorganisms, cells, tissues and organs, making easier their study and the assessment of their metabolic activity.
C5	Manipulate and analyse genetic material and determine its alterations and pathological implications. Knowing the applications of genetic engineering.
C6	Understanding and integrate the functioning of living beings (cellular, tissue, organ and individual level), explaining their homeostatic and adaptive responses.

- C10 Identify biological and biotechnological processes and their potential applications, in particular in health, agri-food and environmental fields.
- C11 Perform and interpret bioassays, identify chemical and biological agents, including pathogens, as well as their toxic products. Develop and apply biological control techniques.
- D4 Collaborate and work in teams or multidisciplinary groups, promote negotiation skills and the ability to reach agreements.

Expected results from this subject

Expected results from this subject	Training and Learning Results			
	A1	B2	C2	D4
Recognise the versatility, potentiality and limitations of the technicians applied to the Biology.	A1 A2 A3	B2 B4	C2 C4 C5 C6 C10 C11	D4
Know and handle the concepts, terminology and scientific instrumentation-technical relative to technicians of laboratory.	A1 A2 A3	B2 B4	C2 C4 C5 C6 C10 C11	D4
Know apply technicians to isolate, identify, handle and analyse specimens and samples of biological origin, as well as to characterise his cellular and molecular constituents.	A1 A2 A3	B2 B4	C2 C4 C5 C6 C10 C11	D4
Comprise the experimental base that bears the current knowledge on the molecular bases of the biological information and his expression.	A1 A2 A3	B2 B4	C2 C4 C5 C6 C10 C11	D4

Contents

Topic	
Advanced microscopy techniques (Module I, Cell Biology) - 11 hours	Immunohistochemistry and immunofluorescence Fluorescence microscopy Electron microscopy
Purification and characterisation of proteins (Module II, Biochemistry) - 18 hours	Protein Mass Spectrometry Protein chromatography Protein electrophoresis Protein enzyme activity assays
Cellular and molecular analysis (Module III, Immunology) - 11 hours	Lymphoid organs, removal of lymphoid cells Cell separation Cell counting and viability Cell preservation ELISA
Recombinant DNA and sequencing (Module IV, Genetics) - 18 hours	Nucleic acid extraction PCR and quantification Cloning and transformation Gene expression Sequencing and analysis

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	0.5	0	0.5
Laboratory practical	11	14	25
Laboratory practical	18	22	40
Laboratory practical	11	14	25
Laboratory practical	18	22	40
Objective questions exam	2	17.5	19.5

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

Methodologies	
	Description
Introductory activities	It describes the method of work that goes to be followed
Laboratory practical	The student is introduced in the most realistic way to the experimental nature of Biology in relation to the techniques of Cell Biology (module I).
Laboratory practical	The student is introduced in the most realistic way to the experimental nature of Biology in relation to the techniques of Biochemistry (module II).
Laboratory practical	The student is introduced in the most realistic way to the experimental nature of Biology in relation to the techniques of Immunology (module III).
Laboratory practical	The student is introduced in the most realistic way to the experimental nature of Biology in relation to the techniques of Genetics (module IV).

Personalized assistance

Methodologies	Description
Laboratory practical	Personalized attention to resolve any doubts that have arisen during the teaching of Module I (Cell Biology). The doubts can be consulted during the weekly tutoring hours.
Laboratory practical	Personalized attention to resolve any doubts that have arisen during the teaching of Module II (Biochemistry). The doubts can be consulted during the weekly tutoring hours.
Laboratory practical	Personalized attention to resolve any doubts that have arisen during the teaching of Module III (Immunology). The doubts can be consulted during the weekly tutoring hours.
Laboratory practical	Personalized attention to resolve any doubts that have arisen during the teaching of Module IV (Genetics). The doubts can be consulted during the weekly tutoring hours.

Assessment

	Description	Qualification	Training and Learning Results
Laboratory practical	CONTINUOUS EVALUATION. Module I, Cellular Biology. The contents and competences acquired in the practices of the module will be evaluated by means of sufficiency tests developed on the dates indicated in the schedule of the four-month period. The integration and involvement of the student in the officially assigned group will also count in the grade of the module.	12	A1 B2 C2 D4 A2 B4 C4 A3 C5 C6 C10 C11
Laboratory practical	CONTINUOUS EVALUATION. Module II, Biochemistry. The contents and competences acquired in the practices of the module will be evaluated by means of sufficiency tests developed on the dates indicated in the schedule of the four-month period. The integration and involvement of the student in the officially assigned group will also count in the grade of the module.	18	A1 B2 C2 D4 A2 B4 C4 A3 C5 C6 C10 C11
Laboratory practical	CONTINUOUS EVALUATION. Module III, Immunology. The contents and competences acquired in the practices of the module will be evaluated by means of sufficiency tests developed on the dates indicated in the schedule of the four-month period. The integration and involvement of the student in the officially assigned group will also count in the grade of the module.	12	A1 B2 C2 D4 A2 B4 C4 A3 C5 C6 C10 C11
Laboratory practical	CONTINUOUS EVALUATION. Module IV, Genetics. The contents and competences acquired in the practices of the module will be evaluated by means of sufficiency tests developed on the dates indicated in the schedule of the four-month period. The integration and involvement of the student in the officially assigned group will also count in the grade of the module.	18	A1 B2 C2 D4 A2 B4 C4 A3 C5 C6 C10 C11
Objective questions exam	The knowledge acquired in the practices and complementary activities developed in the four modules of the subject are evaluated.	40	A1 A2 A3

Other comments on the Evaluation

TBCM is a course with compulsory practicals distributed in four modules (Cell Biology, Biochemistry, Immunology and Genetics). The absence without justification to one or more laboratory sessions prevents the passing of the course. The justified absence (article 15.2 of the regulation on evaluation, grading and quality of teaching and student learning process, of the Universidade de Vigo) to two or more laboratory practices, prevents the continuous evaluation. In that case, students would have to take a global evaluation exam.

The grade of the subject includes:

(a) the grade derived from the continuous assessment (test examinations and delivery of reports) throughout the course -60%- (module I, of Cell Biology, 12%; module II, of Biochemistry, 18%; module III, of Immunology, 12%; module IV, of

Genetics, 18%). A minimum of 3.5 points out of 10 must be obtained in each module. Circumstances such as lack of punctuality, non-integration in the assigned group, or a demotivated or negligent attitude in the laboratories may detract from the final scores.

b) the grade derived from the first or second opportunity exam, to be held on the officially determined dates -40%-. Also in this case, a minimum of 3.5 points out of 10 must be obtained in the part corresponding to each of the four modules.

In the case of students who opt for the GLOBAL EVALUATION, the exam (100% of the final grade) will consist of:

Theoretical part (50% of the final grade). Questions with contents of each of the four modules of the subject, having to obtain a minimum of 3.5 points out of 10 in each module to pass it.

Practical part (50% of the final grade). Resolution of a practical case in each of the four modules that compose the subject, having to obtain a minimum of 3.5 points out of 10 in each module.

Sources of information

Basic Bibliography

Martín-Lacave I y García-Caballero T, **Atlas de inmunohistoquímica. Caracterización de células, tejidos y órganos normales.**, 978-84-9969-013-1, 1a, Editorial Díaz de Santos, 2012

Faro J (coordinador e editor), **Manual de técnicas experimentais en bioloxía molecular e celular**, 978-84-8158-674-9, 1a, Servizo de Publicacións da Universidade de Vigo, 2014

Hunter E, **Practical electron microscopy: a beginner's illustrated guide**, 1993

Lefkovits I, **Immunology methods manual: the comprehensive sourcebook of techniques**, 1997

Nelson DL y Cox MM, **Lehninger: principios de bioquímica**, 978-84-282-1667-8, 7a, Ediciones Omega, 2018

Punt J, Stranford S, Jones P y Owen JA, **Kuby Immunology**, 8a, WH Freeman and Co, 2019

Real MD, Rausell C, Latorre A, **Técnicas de ingeniería genética**, 978-84-9171-071-4, 1a, Editorial Síntesis, 2017

Complementary Bibliography

Valverde D, Megías M y Morán P,

https://www.youtube.com/channel/UCck6B5Y_qUD8T2a5OB7lc-g/videos?shelf_id=0&view=0&sort=dd,

Recommendations

Other comments

It is recommended to work on the subject continuously, review basic mathematics, including solving first degree equations, logarithms, exponentials, linear interpolation, and basic statistics, including least squares linear regression, and analysis of variance.