



IDENTIFYING DATA

Animal and plant histology and cytology I

Subject	Animal and plant histology and cytology I			
Code	V02G030V01303			
Study programme	(*)Grao en Bioloxía			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish Galician English			
Department	Functional Biology and Health Sciences			
Coordinator	Megías Pacheco, Manuel			
Lecturers	Álvarez Otero, Rosa María Megías Pacheco, Manuel Pombal Diego, Manuel Ángel			
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Web				
General description	Mandatory subject of the 2nd year of the Degree in Biology. This subject presents the general characteristics of cells as well as their ultrastructural organization, finishing the programme with cell division processes and the first stages of living beings development.			

Competencies

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.
A4	Students should able to communicate information, ideas, issues and solutions to all audiences (specialist and unskilled audience).
B2	Ability of reading and analyzing scientific papers and having critical assessment skills to understand data collection, deducing the main idea from the least relevant ones and basing on the corresponding conclusions.
B3	Acquisition of general knowledge about the basic subjects of biology, both at theory and experimental level, without dismissing a higher specialization in subjects that are oriented to a concrete professional area.
B4	Ability in handling experimental tools, both scientific and computer technology equipment that support the search for solutions to problems related to the basic knowledge of biology and with those of a concrete labour context.
B5	Understanding of the levels of organization of living beings from a structural (molecular, cellular and organic) and functional point of view by observing their relations with the environment and other organisms, as well as their appearances in situations of environmental alteration.
B7	Collection of information about issues of biologic interest, analysis and emission of critical opinions and reason them including the reflection about social and/or ethical aspects related to the issue.
B10	Development of analytic and abstraction skills, the intuition and the logical and rigorous thought through the study of biology and its uses.
B11	Ability to communicate in detail and clearly: knowledge, methodology, ideas, issues and solutions to all audiences (not only qualified but unskilled in Biology).
B12	Ability to identify their own educational necessities in the biology field and in concrete labour areas and to organize their learning with a high grade of autonomy in any context.
C2	Recognizing different levels of Living systems organization. Performing phylogenetic analysis and identifying evidence of evolution.
C3	Identifying, analysing and characterizing biological samples, including those of human origin, and possible anomalies.

C4	Isolating, analysing and identifying biomolecules, viruses, cells, tissues and organs.
C21	Processing and interpreting bioassays and biological diagnoses.
C25	Gathering background information, develop experimental work and analysing data results
C28	Teaching and sharing knowledge and resources related to Biology
C31	Knowing and handling technical and scientific apparatus.
C32	Knowing and handling basic or specific key concepts and terminology
C33	Understanding the social projection of Biology.
D1	Development of capacity of analysis and synthesis
D5	Use of computer resources related to the study field
D6	Research and interpreting of information from different sources
D7	Resolution of issues and decision making in an effective way
D8	Development of the ability of independent learning
D10	Development of the critical thinking
D14	Adquisition of abilities in the interpersonal relationships

Learning outcomes

Expected results from this subject	Training and Learning Results			
To know the different levels of organization	B5	C2	D6	
To know the structure and function of the eukaryotic cell	B5	C4	D1 D5 D8	
To understand the biology of animal and plant development	B5	C2	D1 D10	
To apply the knowledge of cytology and histology to isolate, identify, handle and analyze biological specimens and samples and to characterize their cellular and molecular constituents	A2	B7	C3 C4	D6 D7
To apply the knowledge and technology of Cytology and Histology in aspects related to production, exploitation, analysis and diagnoses of processes and biological resources		B2	C21 C25	D7
To obtain information, to develop experiments and to interpret results	A3	B2 B7 B10	C25	D1 D7
To understand the social projection of Cytology and Histology and its repercussion in the professional world, as well as to know how to use their contents for teaching and dissemination	A1 A4	B3 B4 B11 B12	C28 C33	D14
To know and to handle the concepts, terminology and scientific-technical instrumentation related to Cytology and Histology		B4	C31 C32	

Contents

Topic	
CELL BIOLOGY	(*)
Introduction	Evolution of the cell concept Cell theory General organization of eukaryotic cells Differences and similarities between animal and plant cells.
Cell membrane and extracellular matrix	Structure, molecular composition and functions Membrane transport Intercellular junctions.
Origin of membranes and intracellular trafficking	Endoplasmatic reticulum and Golgi complex Vesicular trafficking.
Lysosomal system, peroxisomes and vacuoles	Cell digestion Peroxisomes and glyoxysomes Vacuoles: types, structure and functions.
Organelles involved in energy production	Mitochondrial structure and function Chloroplast structure and function Other plastids
The Cytosol	Cytoplasmic inclusions The Cytoskeleton: actin filaments, microtubules and intermediate filaments
The nucleus	Nuclear membrane. Dynamic and structure of chromatin and chromosomes. The nucleolus.
DEVELOPMENTAL BIOLOGY	(*)
Cell cycle	Control of the cell cycle.
Cell division	Mitosis. Meiosis. Cell death: apoptosis and necrosis.

Gametogenesis and fertilization	Oogenesis and spermatogenesis. Fertilization.
Stages of the embryonic development	Early development. Determination and cell differentiation.
LAB SESSIONS	(*)
Session 1. Cell types and extracellular matrix	Observation of cell types and extracellular matrix at light microscopy.
Session 2. Organelles I	Identification of cell organelles at light microscopy
Session 3. Organelles II	Identification of cell organelles in electron microscopy images.
Session 4. Mitosis.	Observation and quantification of mitotic phases in animal and plant tissue
Session 5. Gonads.	Observation of spermatogenesis and oogenesis. Types of gonads.
Session 6. Early development.	Observation of the early development of invertebrates and vertebrates.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	35	70	105
Laboratory practices	12	6	18
Seminars	3	12	15
Other	2	10	12

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

Methodologies

	Description
Lecturing	The contents of the subject will be explained with presentations and short videos.
Laboratory practices	Histology preparations related to different topics covered will be analyzed. Besides, a lab session will be dedicated to study the ultrastructure of the cell.
Seminars	Analysis and discussion of questions proposed by the students or by the instructor.

Personalized attention

Methodologies	Description
Lecturing	Individual support is offered during tutor hours.
Laboratory practices	Individual support is offered during tutor hours.
Seminars	Some activities will be proposed for monitoring the evolution of each student.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	Theoric classes with presentations. Attendance is mandatory.	0				
Laboratory practices	Laboratory practices exam included in the final exam.	20	A2	B4 B5 B12	C2 C3 C4 C21 C25 C31 C32 C33	D1 D5 D6 D7 D8 D10
Seminars	Evaluation of the work developed during the seminars	10	A1 A2 A4	B2 B7 B11	C28	D1 D6 D7 D10 D14
Other	Final exam of the subject	70	A1 A3	B2 B3 B5 B10	C2 C4 C31 C32 C33	D5 D6 D8

Other comments on the Evaluation

- Attendance to all lectures, lab sessions and seminars is required, unless properly justified.
- For approving the subject it is necessary to pass 40% of both theoretical and practice part. On the contrary, the final mark will be the result of multiplying the total mark (theory + practice + seminars) by 0.5 points.

- In case the final evaluation of the subject doesn't achieve the pass (5 points), but the student has approved some parts (theory, practice or seminars), that punctuation will be maintained till the second choice exam (July).
- Repeat students will have to make all the activities of the class and laboratory (seminars and practices).
- **Lectures.** The first thematic block (Cell Biology) will be evaluated with 4 points in a partial exam that will be established in the official calendar. This partial exam will be eliminatory and the students who don't pass it will have the chance to repeat it in the final exam. The second thematic block (Developmental Biology) will be evaluated with 4 points in the final exam whose date is established by the Faculty. The maximum mark of the theoretical part will be of 7 points.
- **Lab sessions.** Lab sessions will be evaluated in the final exam to a maximum of 2 points.
- **Seminars.** Attendance, together with the work made in class, will be evaluated with a maximum of 1 point.
- **Exam to improve the mark.** The students who have passed the final exam but want to improve their mark will have the chance to take this exam that will be established by the instructors.
- **Absent.** A student will be considered absent if he/she did not accomplish any activity of the course.
- **Final exam date.** Exam dates are available in the following web sites:

<http://bioloxia.uvigo.es/en/teaching/exams>

- **Schedules.** The schedules of the subjects are available in the next link:

<http://bioloxia.uvigo.es/en/teaching/schedules>

Sources of information

Basic Bibliography

Complementary Bibliography

Alberts, B.; Johnson, A.; Lewis, J.; Raff, M.; Roberts, K.; Walter, P., **Molecular Biology of the Cell.**, 2015 (6th ed).,
 Becker, W.M.M., Kleinsmith, L.J.; Hardin, J., **The World of the Cell.**, 2012 (8th ed).,
 Browder, L.W.; Erickson, C.A.; Jeffery, W.R., **Developmental Biology.**, 1991 (3th ed).,
 Cooper, G. M.; Hausmann, R.E., **The Cell: a Molecular Approach.**, 2016 (7th ed),
 Gilbert, S.F., **Developmental Biology.**, 2016 (11th ed),
 Lodish, H., Matsudaira, P., Baltimore, D., Berk, A., Zipursky S.L.; Darnell, J., **Molecular Cell Biology.**, 2016 (8th ed),
 Megías, M.; Molist, P.; Pombal, M.A., **Atlas de histología vegetal y animal,**
 Paniagua, R., Nistal, M., Sesma, P., Álvarez-Uría, M.; Fraile, B., **Citología e Histología Vegetal y Animal.**, 2007 (4th ed).,
 Wilt, F.H.; Hake, S.C., **Principles of Developmental Biology.**, 2004,
 Wolpert, L.; Smith, J.; Jessell, T.; Lawrence, P.; Robertson, E.; Meyerowitz, E., **Principles of Development.**, 2015 (5th ed).,

Recommendations

Subjects that are recommended to be taken simultaneously

Biochemistry I/V02G030V01301
 Botany I: Algae and fungi/V02G030V01302
 Microbiology I/V02G030V01304
 Zoology 1: Non-arthropod invertebrates/V02G030V01305

Subjects that it is recommended to have taken before

Biology: Evolution/V02G030V01101
 Biology: Basic laboratory techniques/V02G030V01203
 Chemistry: Chemistry applied to biology/V02G030V01104