



IDENTIFYING DATA

Animal and plant histology and cytology I

Subject	Animal and plant histology and cytology I			
Code	V02G030V01303			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish Galician English			
Department				
Coordinator	Megías Pacheco, Manuel Álvarez Otero, Rosa María			
Lecturers	Álvarez Otero, Rosa María Megías Pacheco, Manuel Pérez Fernández, Juan			
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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.			

Skills

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 be 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	
(*)- Afondar no coñecemento das linguas de especialidade e as súas terminoloxías aplicadas á tradución especializada e ás súas estratexias.				
To know the structure and function of the eukaryotic cell	B5	C4	D1 D5 D8	
To understand the biology of animal and plant development	A2	B2 B3 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 Cell adhesion.
Origin of membranes and intracellular trafficking	Endoplasmatic reticulum. Golgi apparatus. Vesicular trafficking. Endosomes.
Lysosomal system, peroxisomes and vacuoles	Cell digestion. Autophagy. 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 envelop. 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	33	82	115
Laboratory practical	12	6	18
Seminars	3	12	15
Objective questions exam	2	0	2

*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 practical	Histology preparations related to different topics covered will be analyzed. In addition, a lab session will be dedicated to study the ultrastructure of the cell and another one to the early vertebrate development.
Seminars	Analysis and discussion of questions proposed by the students or by the instructor.

Personalized assistance

Methodologies	Description
Lecturing	Individual support is offered during tutor hours. Students will be able to contact the teacher for tutorial sessions via telematic tools (e-mail, video-chat, forums of FAITIC platform, etc.) in concerted appointments.
Laboratory practical	Individual support is offered during tutor hours. Students will be able to contact the teacher for tutorial sessions via telematic tools (e-mail, video-chat, forums of FAITIC platform, etc.) in concerted appointments.
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 practical	Laboratory practices exam. It can be taken immediately after the lab sessions or in the final exam.	20	A2 A3	B2 B4 B5 B7 B10	C3 C4 C25 C31 C32	D1 D5 D6 D7 D8
Seminars	Evaluation of the work developed during the seminars	10	A1 A3 A4	B2 B3 B4 B7 B10 B11 B12	C25 C28 C33	D1 D7 D14

Objective questions exam	Exam evaluating the theoretic classes	70	A2 A3	B2 B3 B5	C2 C4 C21 C25	D1 D5 D6 D7 D8 D10
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Other comments on the Evaluation

- Attendance to all lectures, lab sessions and seminars is required, unless properly justified.
- For passing the subject, it is necessary to get at least 40% of both theoretical and practice parts. Otherwise, the final mark will be the result of multiplying the total mark (theory + practice + seminars) by 0.5 points.
- If the total mark doesn't achieve 5 points out of 10, but the student has passed some parts (theory, practice or seminars), these marks will be maintained till the second choice exam (July).
- Repeat students will have to make all the activities of the subject (seminars and practices).
- **Lectures.** The first block (Cell Biology) will be evaluated with a maximum of 4 points in a midterm exam that will be established in the official calendar. This exam is eliminatory and the students who do not pass it will NOT be allowed to repeat it in the final exam. The students that do not attend this midterm exam can do it in the final exam in the official schedule. The second block (Developmental Biology) will be evaluated with up to 3 points in the final exam, in the date sets by the Faculty. The maximum mark for the theoretical part will be 7 points.
- **Lab sessions.** Lab sessions will be evaluated in a exam immediatly after the lab sessions or in the final exam to a maximum of 2 points.
- **Seminars.** Attendance, together with the work carried out 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.**, (6th ed)., Garland Science, 2015

Bertoni, G.P.; Becker, Wayne M., **The World of the Cell.**, 1-292-17769-1, (9th ed)., Benjamin-Cummings Publish. Comp., 2018

Browder, L.W.; Erickson, C.A.; Jeffery, W.R., **Developmental Biology.**, (3th ed)., Saunders., 1991

Cooper, G. M., **The Cell: a Molecular Approach.**, 9781605358635, (8th ed), ASM Press., 2019

Gilbert, S.F., **Developmental Biology.**, (11th ed), Sinauer., 2016

Lodish, H., Matsudaira, P., Baltimore, D., Berk, A., Zipursky S.L.; Darnell, J., **Molecular Cell Biology.**, (8th ed), W.H. Freeman and Company., 2016

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.**, (4th ed)., McGraw Hill., 2007

Wilt, F.H.; Hake, S.C., **Principles of Developmental Biology.**, Norton & Company., 2004

Wolpert, L.; Smith, J.; Jessell, T.; Lawrence, P.; Robertson, E.; Meyerowitz, E., **Principles of Development.**, (5th ed)., Oxford Univ Press., 2015

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

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 === MIXED

* Teaching methodologies maintained

Laboratory sessions: all students are present in their respective groups, maintaining maximum safety conditions: social distance, use of masks and cleaning of the sites and work instruments after each practical session.

* Teaching methodologies that change

Lectures and seminars: the number of hours and the chronology of contents are maintained. However, due to the need for social distance, only part of the students will attend the classes at the classroom, while maintaining social distance and other safety measures. The rest of the students will attend the classes virtually and live through the Remote Campus of the University of Vigo.

* Tutorships

The tutorials will be carried out through the teacher virtual offices at the Remote Campus of the University of Vigo, by previous request. They can also be carried out via e-mail, using the forums of the Fatic platform of the University of Vigo.

* Modifications (if applicable) of contents

No changes

* Additional bibliography to facilitate self-learning

Alberts et al., 2014. Essential Cell Biology. 4ª Ed. Garland Science. ISBN: 978-0-8153-4454-4;
<https://archive.org/details/essential-cell-biology-4th-edition>

Pollard et al., 2001. Cell Biology. 2ª Ed. Saunders, Elsevier. ISBN: 1-4160-2255-4;
https://archive.org/details/cellbiology_202001

Gilbert et al., 2010. Developmental Biology. 9ª Ed. Sinauer Associated. SBN: 978-0-87893-384-6;
https://archive.org/details/DevelopmentalBiology_201803/mode/2up

* Other changes.

No changes

=== ADAPTATION OF THE TESTS ===

* Tests already carried out

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

No changes

* Pending tests that are maintained

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

No changes

* Tests that are modified

[Previous test] => [New test]

No changes

* New tests

No changes

* Additional Information

All assessments and their rates are maintained in the final grade. However, the assessments, Theory and Practice, will be done online via the FAITIC-Moddle platform of the University of Vigo.

The laboratory practice exam will be shortly after the last practice is completed and will be eliminatory, or alternatively it can be on the date of the final exam.

=== ADAPTATION OF THE METHODOLOGIES === ONLINE

* Teaching methodologies maintained

Lectures and seminars: the number of hours and the chronology of contents are maintained. Lectures and seminars will be online and streamed through the Remote Campus of the University of Vigo.

Laboratory practices: the lab sections will be carried out by using material available on Internet (see additional bibliography). This resources consists of web sites desaling with Cellular Biology and Histology.

* Tutorships

The tutorials will be carried out through the teacher virtual offices at the Remote Campus of the University of Vigo, by previous request. They can also be carried out via e-mail, using the forums of the Faitic platform of the University of Vigo.

* Modifications (if applicable) of contents

The contents will not be modified.

* Additional bibliography to facilitate self-learning

Alberts et al., 2014. Essential Cell Biology. 4ª Ed. Garland Science. ISBN: 978-0-8153-4454-4;
<https://archive.org/details/essential-cell-biology-4th-edition>

Pollard et al., 2001. Cell Biology. 2ª Ed. Saunders, Elsevier. ISBN: 1-4160-2255-4;
https://archive.org/details/cellbiology_202001

Gilbert et al., 2010. Developmental Biology. 9^o Ed. Sinauer Associated. SBN: 978-0-87893-384-6;
https://archive.org/details/DevelopmentalBiology_201803/mode/2up

Brelje T.C., Sorenson L.R. Histology Guide. 2015-. (<http://www.histologyguide.org/index.html>)

Dee et al., 2010. Virtual Slidebox of Histology. University of Iowa Department of Anatomy and Cell Biology.
(<http://www.path.uiowa.edu/virtualslidebox/>)

Jones EJ, Usrey WM. Brain Maps. 2011. UC Regents Davis campus, 2005-2013. (<http://brainmaps.org/>)

Pedrosa et al., 2010. Atlas Histológico Interactivo. Universidad de Jaen. (Creative common share).
(<http://www.ujaen.es/investiga/atlas/>)

Histology and Virtual Microscopy Learning Resources. 2010. University of Michigan Medical School (Creative Commons Attribution-Noncommercial-Share Alike 3.0 License). (<http://histology.medicine.umich.edu/>)

School of Medicine. University of Indiana. (Pathology, Medical Student Collection) (https://vmicro.iusm.iu.edu/index_sub.html)

School of Medicine. University of Indiana. (Additional resources) (https://vmicro.iusm.iu.edu/index_add_collection.html)

* Other changes.

No changes.

=== ADAPTATION OF THE TESTS ===

* Tests already carried out

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

No changes

* Pending tests that are maintained

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

No changes

* Tests that are modified

[Previous test] => [New test]

No changes

* New tests

No changes

* Additional Information

All assesments and their rates are maintained in the final grade. However, the assessments, Theory, Seminars, and Practice, will be done online through the FAITIC-Moddle platform of the University of Vigo.

The laboratory practice exam will be shortly after the last practice is completed and will be eliminatory, or alternatively it can be on the date of the final exam.
