



IDENTIFYING DATA

Animal and plant histology and cytology II

Subject	Animal and plant histology and cytology II			
Code	V02G031V01208			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Molist García, María del Pilar			
Lecturers	Molist García, María del Pilar			
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General description	Cytology and plant and animal histology II is one of the mandatory subjects that is taught in the second semester of the 2nd year of the Degree of Biology. This course exposes the basic biological principles of microscopic organization of animal and plant tissues, and their assembly in the constitution of organs. It aims to know the anatomy and morphology of plant and animal tissues and organs and the various cell types that compose them. It is an English friendly subject.			

Training and Learning Results

Code	
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	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.
B3	Apply the knowledge acquired in the degree and use the scientific-technical instrumentation and CIT in contexts of Biology and/or related to the professional practice.
B6	Develop analysis and synthesis, critical reasoning and argumentation skills, applying them in Biology and other scientific-technical disciplines.
C1	Solve problems by applying the scientific method, the concepts and terminology specific to biology, mathematical models and statistical and computer tools.
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.
C6	Understanding and integrate the functioning of living beings (cellular, tissue, organ and individual level), explaining their homeostatic and adaptive responses.
D1	Understand the meaning and use of the gender perspective in the different fields of knowledge and in professional practice with the aim of achieving a fairer and more equal society.
D2	Communicate speaking and in writing in Galician.
D3	Commitment to sustainability and the environment. Equal, sensible and efficient use of resources.

Expected results from this subject

Expected results from this subject	Training and Learning Results			
To know the histology and anatomy of animal and plant tissues and organs.	A4	B6	C2	D3
Knowledge of the different cell types that make up plant and animal tissues.	A3	B6	C2	D3
	A4		C6	
To apply knowledge of cytology and histology to isolate, identify, handle and analyze specimens and samples of biological origin, as well as to characterize their cellular and molecular constituents.	A4	B2 B3	C1	D1

To apply knowledge and technology related to Cytology and Histology in aspects related to the production, exploitation, analysis and diagnosis of biological processes and resources.	A3	B6	C1	D1
Obtaining information, carrying out experiments and interpreting the results.	A3	B3 B6	C6	D1 D3
Understanding the social projection of Cytology and Histology and its repercussions on professional practice. Be able to use its contents for teaching and dissemination.	A4	B3	C1	D2
Knowledge and handling of the concepts, terminology and scientific-technical instrumentation related to cytology and histology.	A3	B2 B6	C1	D3

Contents

Topic

I. Thematic block. Histology and microscopic animal Organography	<p>Lesson 1.- INTRODUCTION TO THE ANIMAL TISSUES: COATED AND GLANDULAR EPITHELIA. Histogenesis and differentiation of animal tissues. General characteristics of the epithelia. Types of epithelial cells and functions. The basement membrane: location and composition. Histogenesis. Coating epithelia: classification and localization. Special types. Epithelial regeneration and regeneration. Glandular epithelia. Secretion: concept and types. Classification and function. Exocrine and endocrine glands. Control of secretion.</p> <p>Lesson 2.- THE CONNECTIVE TISSUE: VARIETIES. ADIPOSE TISSUE. General characteristics: cell types and extracellular matrix. Varieties of connective tissue: characteristics and location. Adipose tissue: types, morphological and functional characteristics. Histogenesis.</p> <p>Lesson 3.- SUPPORTING TISSUES: CARTILAGINOUS, BONE AND CORDAL TISSUES. Cartilage: general characters: cell types and extracellular matrix. Histogenesis and growth. Varieties. Degeneration and regeneration. Cordial tissue. Bone tissue: cell types and extracellular matrix. Types of bone and varieties. Ossification: intramembranous and endochondral. Functional aspects</p> <p>Lesson 4.- BLOOD AND LYMPH. THE IMMUNE RESPONSE. Blood: general characteristics. Plasma. Blood elements: types and functions. Agglutination and coagulation. Lymph: composition and formation. Hematopoiesis. Lymphopoiesis. Cellular bases of immunity. Humoral and cellular immunity.</p> <p>Lesson 5.- THE MUSCLE TISSUE. Generalities and classification. Skeletal, smooth and cardiac muscle: organization and structure, innervation and contraction. Histogenesis, growth and regeneration. Modifications of muscle tissue: the electrical organs.</p> <p>Lesson 6.- THE NERVOUS TISSUE. Generalities. Neurons: characteristics, classification and organization. Glia: types, characteristics and functions. Synapsis: types and classification. CNS: organization. PNS: organization. Clinical examples of synaptic function.</p>
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II. Thematic block. Histology and microscopic plant organography

Lesson 7.- THE VEGETABLE CELL AND THE VEGETABLE ORGANISM. Characteristics of the plant cell. The cell wall: structure, formation and growth. Specializations of the cell wall: plasmodesms and pits. Basic organization of the upper floors. Plant organs: general arrangement of tissue systems: Main features. Formation of the body of the plant.

Lesson 8. MERISTEMS

Concept. Cytological characteristics. Classification: primary and secondary meristems.

Lesson 9.- PARENCHYMA AND nd FABRICS OF SUSTAIN.

Parenchyma: structure, functions and types. Collenchyma: structure and varieties. Sclerenchyma: cellular types.

Lesson 10.- VASCULAR TISSUES: XYLEM AND PHOEM.

Characteristics and celular types of xylem. Organization of primary and secondary xylem. Phloem: organization and cell types. Function and structure. Vascular tissues in the primary and secondary growth of the plant: structure and differentiation.

Lesson 11.- PROTECTION AND GLANDULAR TISSUES.

Epidermis: cell types. The cuticle. Stomas: structure, function and differentiation. Trichomes. Periderm: structure. Lenticel. Activity of the phellogen: the rhytidom. External and internal secretory structures.

Lesson 12.- VEGETATIVE ORGANS.

Root, stem and leaves: tissues organization in primary and secondary growth.

Lesson 13.- REPRODUCTIVE ORGANS. FLOWER, FRUIT AND SEED

Structure of the flower. Histology of stamens: microsporogenesis and formation of pollen grain. Histology of carpels: megasporogenesis and development of the embryonic sac. Germination of pollen grain. Fertilization. The fruit and the seed.

III thematic Block: Practices

Practice 1. Tegument and associated glands. Hair follicle. Glands of the endocrine system: thyroid and adrenal.

Practice 2. Digestive system: tongue, esophagus, stomach, intestine. Glands associated with digestive I: salivary.

Practice 3. Glands associated with digestive II: pancreas and liver. Circulatory system: blood and heart.

Practice 4. Respiratory system: trachea and lung. Excretory system: kidneys.

Practice 5. Nervous system: spinal cord. Plant organography: root and leaves.

Practical 6. Plant organography: stems.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	33	76	109
Laboratory practical	12	18	30
Seminars	3	5	8
Objective questions exam	1	0	1
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	Presentation by the teacher of the basic concepts of the subject in order for the student to acquire the skills. Dialogue and discussion in class will be promoted based on some practical example. Questionnaires will be conducted after each topic or group of topics, whose questions will be asked mostly in English. The presentations will also have a percentage of slides in English to facilitate learning for foreign students. It is an English friendly subject. Questionnaires will be taken after each topic or group of topics, the questions will be asked mostly in English. The presentations will also have a percentage of slides in English to facilitate learning for foreign students. It is an English friendly subject.
Laboratory practical	Introduction of the practice by the teacher followed by the microscopic identification of tissues and organs, following the script that will be available on the Tema platform prior to its realization. Acquisition of basic skills associated with observation and histological description.
Seminars	In the seminars the teacher will give a general explanation of several topics, after which each student will have to expose with the support of two or three photographs the knowledge previously explained. In addition there will be problems that students will have to solve in small groups.

Personalized assistance

Methodologies	Description
Lecturing	In addition to the advice and clarifications that are made during the theory classes, students will be attended individually in the tutoring hours. Attention to the student can be done via telematics (email, videoconference, Moovi forums, etc.) under the modality of prior agreement.
Laboratory practical	Histological preparations related to the topics covered in the theoretical part will be analyzed. Histological studies will be carried out on the different organs where the different tissues are analyzed. The students will be able to ask the teacher and they can also support their analysis in a script that is sent to them before each practice. The script also presents a series of exercises that students will have to fill in during practice.

Assessment

Description	Qualification	Training and Learning Results
Lecturing	15	A4 B6 C2 D3
Laboratory practical	24	A3 B3 C2 D2 A4 B6 D3
Seminars	11	A3 B2 C1 D1 A4 B3 D2 D3
Objective questions exam histology.	35	A3 B6 C1 D1 C6 D3
Objective questions exam histology.	15	A3 B6 C1 D1 A4 C6 D3

Other comments on the Evaluation

Attendance to theory classes, practices and seminars is mandatory for all students and will be subject to rigorous control in the second year students. Continuous monitoring of attendance to theory and practice, as well as intervention in the seminar debates, will be used to monitor the performance of the student. The student will have to have at least 80% of attendance to the different activities to be evaluated.

The evaluation of the subject Cytology and Histology Animal and Plant II will combine written tests and continuous evaluation throughout the course.

A) Evaluation of the seminar.

The evaluation of the seminar (maximum value: 1,1 point out of 10) will be carried out continuously during the course.

As there are three seminars the value of each will be 0.3 points. This note is achieved by assessment of knowledge, and attendance at the three seminars will add the remaining 0.2. The inclusion of the value of the seminar in the final grade of the subject will be carried out if and only if the student is submitted to the official examination of the subject.

The qualification of the seminar will be kept within the current course.

B) Practical Assessment

Throughout the practices will be carried out three tests that will mainly consist of the identification of tissues and / or organs through the observation of slides. Each test will have a maximum value of 0.8 points over 10. The qualification of the practices

will remain within the current course.

C) Theoretical valuation

There will be two written tests where the theoretical knowledge of the subject will be assessed. In these tests, questions integrating theoretical and practical knowledge may be asked. The maximum value of both tests is 5 points out of 10, of which 3.5 points will correspond to the part of animal histology that will be carried out on the official date and the rest, 1.5 points will correspond to the part of plant histology, which will take place once that part is finished.. The format of questions will be varied and may include:

- 1) Short answer questions.
- 2) Questions that link the identification of images /schemes with theoretical concepts.
- 3) Test questions (single /multiple answer), based on knowledge acquired in the classroom and in the laboratory.

D) Assessment of the questionnaires (self-evaluation)

Throughout the development of the subject, 5 self-assessment questionnaires will be carried out using the Moovi platform. Each questionnaire will comprise questions corresponding to a group of theoretical lessons. They will take place in the classroom and each one will have a value of 0.3 points. Within the course schedule, a series of days will be assigned to complete the questionnaires. These days will be put in the subject's activity table so the student will know these dates well in advance. All this means that there will be no excuse not to take the questionnaire unless it is an emergency. In any case, the questionnaires only have a completion date.

E) Final grade of the subject. To pass the subject, it is necessary to surpass 50% of the theoretical part (2,5) and 50% of the practical part (1,2). Otherwise, the final grade will be the result of multiplying the total grade (theory + practices + seminars + questionnaires) by 0.5.

Students who reject the continuous assessment may request the global assessment in the period established by the center. The evaluation will be carried out on the official dates of first and second opportunity. This evaluation will make it possible to achieve 100% of the score for the subject in an exam broken down into three parts: theoretical content (5 points), practical content (3 points) and seminars (2 points).

Repeating students from other courses must take the seminars and quizzes. If they consider and voluntarily, they may or may not attend the practices, but it is mandatory to take the exams that are carried out during the course.

According to the scale determined by the University of Vigo, the subject of Cytology and Histology Animal and Plant II will have numerical qualification with only one decimal, with the following equivalence:

NOT SUBMITTED, will be the student who does not take the final exam.

NOT PASS: 0-4,9

PASS: 5-6,9

NOTABLE: 7-8,9

OUTSTANDING: 9-10

HONOR REGISTRY: Awarded to students who have obtained a grade of 9 or higher. Their number may not exceed 5% of students enrolled in a subject in the corresponding academic year, unless the number of students enrolled is less than 20, in which case, a single Matriculation of Honor may be granted.

The dates of the exams and the class schedules can be consulted in the web page of the faculty being susceptible of modification in special circumstances.

<http://bioloxia.uvigo.es/es/docencia/grado-en-biologia/horarios>

Sources of information

Basic Bibliography

Álvarez Nogal R., **Citología e Histología de las plantas**, 1. ed, Eolas Ediciones., 2015

Brüel, A., Christensen, E.I., Qvortrup, K., Tranum-Jensen, J., Geneser, F., **Geneser Histología**, 4ª edición, Médica Panamericana, 2014

Cortés Benavides, F., **Cuadernos de Histología Vegetal**, 3ª edición, Editorial Marban, 1990

Evert, R.F., **Esau's Plant Anatomy: Meristems, Cells, and Tissues of the Plant Body □ Their Structure, Function, and Development**, 3ª edición. New Jersey., Wiley & Sons, Inc., 2007

Gartner, L.P., Hiatt, J.L., **Atlas en Color y Texto de Histología**, 8ª edición, Wolters kluwer, 2023

Kierszenbaum, A.L., Tres, L.L., **Histology and cell biology An introduction to pathology**, 5ª edición, Elsevier, 2019

Megías, M., Molist, P., Pombal, M.A., **Atlas de Histología Vegetal y Animal**, <http://webs.uvigo.es/mmegias/inicio.html>, Schünke, M., Schulte, E., Schumacher, U., **Colección Prometheus. Texto y Atlas de Anatomía (3 tomos)**, 3ª edición, Médica Panamericana, 2015

Craig, A. Canby, **Anatomía basada en la resolución de problemas**, 1ª ed, Elsevier, 2007

Schweingruber F.H.; Borner A.; Schulze E-D., **Atlas of stem anatomy in herbs, shrubs and trees vol 1 y 2**, Springer-Verlag, 2013

Liebich Hans-Georg, **Veterinary Histology**, 5ª, 5m, 2019

Álvarez Nogal, R, **Morfología microscópica de las plantas**, 1ª, Mac. Graw Hill Aula Magna, 2024

Complementary Bibliography

Welsch, U., **Sobotta. Histología (con la colaboración de T. Deller)**, 3ª edición, Médica Panamericana, 2014

Donald McMillan Richard Harris, **An Atlas of Comparative Vertebrate Histology**, 1st Edition, Academic Press, 2018

Pawlina, W., **Ross Histología. Texto y atlas. correlación con la Biología Molecular y Celular.**, 8edición, Wolters Kluwer, 2020

Treuting, dintzis Montine, **Comparative Anatomy and Histology**, 2nd, Elsevier, 2017

LaDouceur E.E.B, **Invertebrate histology**, 1ª, Wiley, 2021

García-Garza, R., **Cuaderno de histología para colorear**, 1ª, Elsevier, 2023

Recommendations

Other comments

A responsible commitment to learning reflected in the attitude throughout the course and in the aptitude associated with the acquisition of knowledge, will enable the passing of the subject. Studying the subject in a continuous way will enable the student to participate actively in the course. Knowing, understanding, reflecting and reasoning about the basic knowledge of the course, with a mature attitude, will be useful to participate in the different activities proposed by the teaching staff and guarantee of success in the course