

**Histology**

Code: 100782  
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OB	1	2

## Contact

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## Teaching groups languages

You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

## Prerequisites

There are no official prerequisites. However, it is assumed that the student has assimilated the learning skills of "Cell Biology".

To access to study "Histology" the student must have passed the safety test. This can be found in the virtual campus.

## Objectives and Contextualisation

The teaching objectives of the course "Histology" are the acquisition by the students of basic knowledge about the vertebrate tissues organization. Similarly, the concepts on the "Histology" are essential for understanding of more specialized courses in the Biology degree such as "organs and systems histology" and "Developmental biology".

"Histology" is a theoretical and practical course. This makes it possible to continually interact with theoretical concepts scientific content of the placement.

Objectives:

- .- To know the diversity of animal cells.
- .- To understand the links among tissues.
- .- To be able to distinguish among animal tissue characteristics.
- .- To define an animal tissue using light microscopy
- .- To do the histological analysis of certain animal tissues using light microscopy.

## Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Be able to analyse and synthesise
- Be able to organise and plan.
- Design and carry out biodiagnoses and identify and use bioindicators.
- Isolate, identify and analyse material of biological origin.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Understand the processes that determine the functioning of living beings in each of their levels of organisation.
- Work in teams.

## Learning Outcomes

1. Analyse a situation and identify its points for improvement.
2. Be able to analyse and synthesise.
3. Be able to organise and plan.
4. Critically analyse the principles, values and procedures that govern the exercise of the profession.
5. Describe animal and plant tissues, taking into account the morphology, microscopic and ultra-microscopic structure and cytophysiology of their components.
6. Identify the cell types that, while maintaining their differentiation, coexist in a single tissue environment.
7. Obtain samples of animal or plant material and use histological methodologies to perform a microscopic analysis.
8. Propose new methods or well-founded alternative solutions.
9. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
10. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
11. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
12. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
13. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
14. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.

15. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
16. Work in teams.

## **Content**

### LECTURES SESSIONS

#### Chapter 1. Animal tissue

Cellular component and extracellular matrix. Cell adhesion and communication. Tissue integrity. Basic animal tissue types.

#### Chapter 2. The epithelial tissue

Domains in an epithelial cell. Polarity in epithelial cells and communication. Basement membrane. The lining epithelium: Structural and physiological properties. Types of lining epithelia. Glandular epithelia: types of secretory cells. Classification and characteristics of exocrine glands. Function of the endocrine glands.

#### Chapter 3. The connective tissue

Extracellular matrix: fibers and surrounding matrix. Fibroblasts and their genesis. Mast cells. Plasma cells. Macrophage and phagocyte mononuclear system. Classification of supporting tissues. Relationship between epithelium and connective tissue.

#### Chapter 4. The adipose tissue

Adipose cell. White and brown fat cells: structure, function and anatomical distribution. Fat metabolism.

#### Chapter 5. The cartilage

Matrix. Chondrocyte. Types of cartilage: hyaline, elastic and fibrocartilage. Cartilage metabolism.

#### Chapter 6. The bone tissue

Bone cytoarchitecture. Bone matrix. Osteoblasts-osteocytes: structure and function. Osteoclasts and remodeling of the bone. Histophysiology. Immature and lamellar bone: osteons, interstitial and circumferential lamellae. Bone remodeling: bone remodeling units.

#### Chapter 7. The blood

Plasma and formed elements: Erythrocytes: function. Platelets and thrombocyte: blood coagulation. Leukocytes. Granulocytes: neutrophils, eosinophils and basophils. Agranular leukocytes: monocytes and lymphocytes.

Hematopoiesis. Hemopoietic bone marrow. Erythropoiesis. Thrombopoiesis. Granulopoiesis. Agranular leukocytes production.

#### Chapter 8. The immune system

Humoral response. Cellular response. Effector and memory cells. T and B cells. Macrophages and the immune system.

#### Chapter 9. The muscle tissue

Categories of muscle. Skeletal muscle cytoarchitecture. Muscle fibers. Sarcomeres. Myofibrils. Physiology of the muscle contraction. Cardiac fiber. Intercalate discs. Smooth muscle fibers: contraction.

### PRACTICAL SESSIONS\*

Session 1. Microscopic methods for histology. Microscopic examination of the epithelial tissue. Analysis of the electron micrographs.

Session 2. Microscopic examination of the connective and adipose tissues. Analysis of the electron micrographs.

Session 3. Microscopic examination of the cartilage and bone tissue. Analysis of the electron micrographs.

Session 4. Sheep blood smear elaboration. Blood investigation with smear and investigation of the formed elements. Analysis of the electron micrographs.

## **Methodology**

The contents of "Histology" include theory, seminars and practical sessions.

### Theory lessons

The program theory is taught in 30 classes. They will be done using audiovisual material, which will be at the disposition of the students in the Virtual Campus.

### Seminars

There are 6 seminars. They are designed so that the students work in small groups, and acquire skills of teamwork and critical reasoning. The students were divided into groups of 4 to 6 people.

This section includes two types of seminars:

1.- Microscopic diagnostic. Students have to solve questions related to the aspects dealt in the theory lessons. At the start of the seminar, it will be provided, to groups of students, several photos of cells and tissues; these must be identified and, then deliver to the teacher for evaluation. All of the questions will be discussed during the session. It will be required the participation of the students and the teacher.

2.- Literature reviews. Students are required to work in a specific item, from the lecture sessions, for the subsequent collective discussion and public presentation. The groups of students and the items that they have to prepare will be established during the seminar number one. In the remaining seminars some groups of students must submit a manuscript, with the proposed topic, to the professor. The same students have to do a public exposition of the proposed item. The references are listed in the virtual campus. The attendance at seminars is mandatory.

### Individual coaching sessions

Individual coaching sessions will take place in a personalized way in the professor room. These sessions should be used to clarify concepts and to establish the acquired knowledge. They can also take advantage to resolve questions that students have about the preparation of seminars.

### Practical sessions

The practical sessions will be done in small groups of students (about 20 per session) in the laboratory. They are designed to learn how to use the laboratory apparatus. These practical sessions are complemented with theory lessons. The goal of these sessions is to do histological sections, microscopic diagnosis and individual delivery of questionnaires.

Students will have a detailed assistance handbook at the beginning of the course. It is essential to read the proposed practical session before its realization. A practical session will involve to draw microscopic images in a dossier.

There will be a global test. This consist on the diagnosis of microscopic structures observed along the academic period. The attendance at practical sessions is mandatory.

If there is a minimum number of interested students, one of the practice groups will be in English; students can sign up freely in this group before the start of the course.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practical sessions	14	0.56	6, 7, 2
Seminars	6	0.24	5, 2, 16
Theory lessons	30	1.2	5, 2
Type: Supervised			
Custom tutorials	6	0.24	5, 2
Type: Autonomous			
Preparation of seminars	25	1	5, 6, 2, 16
Resolution of practical seminars	2.5	0.1	6, 7, 2
Study	60	2.4	5, 2

## Assessment

The evaluation of the course will be continued through individual test that assess:

- Individual learning by students from theory lessons, seminars and practical sessions.

Evaluations activities planned in the course of "Histology" are:

Exams: two partial exams. Each test will be worth 70% of the final grade. To pass this part of the course, students must achieve a minimum of 4 points (from 0 to 10) in each partial exam. Whether this minimum is not achieved, students must do a final full or partial exam

Seminars: They will be worth 10% of the final grade as follows:

Written work	20%	this work will be assessed by the professor
Oral presentation	40%	this work will be assessed by the professor
inter-group evaluation	10%	
Microscope diagnostic	30%	this work will be assessed by the professor
TOTAL	100%	

The attendance at seminars is mandatory. If a student do not attend any of the seminar sessions, because not justified, there will be a penalty in the final grade of the seminars.

- i) Absence to 1 session = discount of 20% of the grade.
- ii) Absence to 1 session = discount of 40% of the grade.
- iii) Absence to 1 session = discount of 80% of the grade.

Practical sessions: They will be worth 20% of the final grade as follows:

- i) Evaluation of the contents at the end of each practical session (50% of the grade). This test consist of a set of questions as well as recognition of microscopic structures. The final grade of this section is obtained from the average of the grades obtained in each practical session. The attendance at the practical sessions is mandatory. If a student do not attend any of the practical session, because not justified, the grade will be zero.
- ii) Test of microscopic diagnostic (50% of the grade). This test will consist in the diagnosis of microscopic structures proposed along the course. To be able to weigh the notes obtained in each section, it will be essential that students get a rating equal to or greater than 4 points (out of 10) in each one of them. Students who have received a final grade lower than 5 (of 10) required to write an examination of recovery, which will consist of a microscopic diagnosis test and a questionnaire.

#### Single assessment

This subject includes single assessment. In this sense, this consists of a single global test that will coincide with the same date set in the calendar for the last continuous assessment test (2nd partial) and the same system will be applied in case of need for recovery.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Questionnaires of practices	Weight 20%	1	0.04	5, 6, 13, 2, 3
Seminars	Weight 10%	0.5	0.02	15, 14, 4, 1, 5, 6, 8, 12, 11, 9, 10, 2, 3, 16
Tests	Weight 70%	5	0.2	5, 6, 7, 13, 12, 2, 3

## Bibliography

### BOOKS

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Geneser, F.: Histología (ed. Panamericana).

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Krstic, R.V.: Los tejidos del hombre y de los mamíferos (ed. McGraw Hill).

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Welsch. U.: Sobotta Welsch Histología (ed. Panamericana).

#### ATLASES

Boya, J.: Atlas de Histología y Organografía microscópica (ed. Panamericana).

Cross, P.C. y Mercer, K.L.: Cell and tissue ultrastructure. A functional perspective (ed. Freeman and Company).

Eroschenko, V.P.: Di Fiore's atlas of Histology (ed. Lea and Febiger).

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Kühnel, W.: Atlas color de Citología e Histología (ed. Panamericana).

Stanley, L.E. y Magney, J.E.: Coloratlas Histología (ed. Mosby).

Young, B. y Heath, J.W.: Histología funcional (Wheater) (ed. Churchill Livingstone).

<https://www.histologyguide.com/>

#### **Software**

No specific software