# Information about the course

**Degree:** Bachelor of Science Degree in Medicine

**Faculty:** Faculty of Medicine and Health Sciences

**Code:** 340203 **Name:** Histology

**Credits**: 6,00 ECTS **Year:** 2 **Semester:** 1

**Module:** Morphology, structure and function of the human body

**Subject Matter:** Morfología y estructura microscópica del cuerpo humano **Type:** Obligatoria

**Branch of knowledge:** Ciencias de la Salud

**Department:** Pathology

**Type of learning:** Classroom-based learning

**Language/-s in which it is given:** Spanish

**Teachers:**

| | | |
|---|---|---|
| 342A | Jose Angel Garcia Garcia **(Profesor responsable)** | joseangel.garcia@ucv.es |
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## Module organization

### Morphology, structure and function of the human body

| Subject Matter | ECTS | Subject | ECTS | Year/semester |
|---|---|---|---|---|
| Anatomía | 27 | Anatomy II | 9 | 2/1 |
| | | Anatomy III | 6 | 2/2 |
| | | Embryology and Anatomy I | 12 | 1/2 |
| Biología | 6 | Cell Biology | 6 | 1/1 |
| Bioquímica | 9 | Biochemistry and Molecular Biology | 9 | 1/2 |
| Física | 6 | Biophysics | 6 | 1/2 |
| Fisología | 12 | Human Physiology I | 6 | 2/1 |
| | | Human Physiology II | 6 | 2/2 |
| Morfología y estructura microscópica del cuerpo humano | 6 | Histology | 6 | 2/1 |

## Recommended knowledge

GENERAL OBJECTIVES

Identify the microscopic structure of the tissues and organs of the human body and their cellular and molecular composition.Know the use and management of the optical microscope, the procedures for histological study and acquire the appropriate methodology and skills for the microscopic observation of tissues.Learn to identify the cells and molecules of the tissues and organs of the human body in order to understand their functioning, their adaptive changes and the alterations that lead to their anatomo-pathological lesions.Understand the contribution of cells and molecules to the structure and functioning of the tissues and organs of the human body, to their development, differentiation, maintenance, renewal, regeneration and aging.To understand the molecular and genetic mechanisms that regulate the functioning of the tissues and organs of the human body, and the clinical interest of their cellular, molecular and genetic biomarkers in the identification, study and monitoring of the disease and its treatment.To know the cellular and molecular processes that precede the structural and functional pathology of the organs of the human body, in order to understand the importance of tissue and organ injuries in the genesis of the clinical manifestations of the disease.

## Learning outcomes

Al finalizar la asignatura, el estudiante deberá demostrar haber adquirido los siguientes resultados de aprendizaje:

### R1 - Know and understand the intra and pericellular, intercellular and extracellular molecular and subcellular structures of different cell varieties in the context of the 4 basic tissues of the human body.

Learning outcomes of the specified title

**Type of AR:** Description

- Knowing the morphology, structure and function of the skin, blood, circulatory, digestive, locomotive, reproductive, excretor and respiratory systems; endocrine system, immune system and central and peripheral nervous system. Growth, maturation and aging of different devices and systems. Homeostasis. Adaptation to the environment

- Recognizing with macroscopic, microscopic and imaging techniques the morphology and structure of tissue, organs and systems

- Understanding and recognizing the normal structure and function of the human body, at the molecular, cellular, tissue, organic and systems levels, at the different stages of life and in both sexes

### R2 - Know and understand the distribution, molecular and cellular composition, and structural and functional organization of the 4 basic tissues of the human body.

Learning outcomes of the specified title

**Type of AR:** Description

- Knowing the morphology, structure and function of the skin, blood, circulatory, digestive, locomotive, reproductive, excretor and respiratory systems; endocrine system, immune system and central and peripheral nervous system. Growth, maturation and aging of different devices and systems. Homeostasis. Adaptation to the environment

- Recognizing with macroscopic, microscopic and imaging techniques the morphology and structure of tissue, organs and systems

- Understanding and recognizing the normal structure and function of the human body, at the molecular, cellular, tissue, organic and systems levels, at the different stages of life and in both sexes

R3 - Know and understand the microscopic structure, the composition and organization of the cells, tissues and organs of the human body in the functional context of its differentiation, maintenance and renewal, its adaptive, defensive and regenerative responses, and its aging.

Learning outcomes of the specified title

**Type of AR:** Description

- Knowing the morphology, structure and function of the skin, blood, circulatory, digestive, locomotive, reproductive, excretor and respiratory systems; endocrine system, immune system and central and peripheral nervous system. Growth, maturation and aging of different devices and systems. Homeostasis. Adaptation to the environment

- Recognizing with macroscopic, microscopic and imaging techniques the morphology and structure of tissue, organs and systems

- Understanding and recognizing the normal structure and function of the human body, at the molecular, cellular, tissue, organic and systems levels, at the different stages of life and in both sexes

R4 - Knowing and understanding the physiological and pathological implications of the structure, cell composition and functioning of human body tissues an

Learning outcomes of the specified title

**Type of AR:** Description

- Knowing the morphology, structure and function of the skin, blood, circulatory, digestive, locomotive, reproductive, excretor and respiratory systems; endocrine system, immune system and central and peripheral nervous system. Growth, maturation and aging of different devices and systems. Homeostasis. Adaptation to the environment

- Recognizing with macroscopic, microscopic and imaging techniques the morphology and structure of tissue, organs and systems

- Understanding and recognizing the normal structure and function of the human body, at the molecular, cellular, tissue, organic and systems levels, at the different stages of life and in both sexes

## R5 - Know and understand the objectives of medical research in relation to knowledge about the structure and functioning of the tissues and organs of the human body in health.

Learning outcomes of the specified title

**Type of AR:** Description

- Knowing the morphology, structure and function of the skin, blood, circulatory, digestive, locomotive, reproductive, excretor and respiratory systems; endocrine system, immune system and central and peripheral nervous system. Growth, maturation and aging of different devices and systems. Homeostasis. Adaptation to the environment

- Recognizing with macroscopic, microscopic and imaging techniques the morphology and structure of tissue, organs and systems

- Understanding and recognizing the normal structure and function of the human body, at the molecular, cellular, tissue, organic and systems levels, at the different stages of life and in both sexes

## R6 - Recognize and identify extracellular cells and structures of basic tissues of the human body, using methods of digital microscopy and histochemical staining.

Learning outcomes of the specified title

**Type of AR:** Description

- Knowing the morphology, structure and function of the skin, blood, circulatory, digestive, locomotive, reproductive, excretor and respiratory systems; endocrine system, immune system and central and peripheral nervous system. Growth, maturation and aging of different devices and systems. Homeostasis. Adaptation to the environment

- Recognizing with macroscopic, microscopic and imaging techniques the morphology and structure of tissue, organs and systems

- Understanding and recognizing the normal structure and function of the human body, at the molecular, cellular, tissue, organic and systems levels, at the different stages of life and in both sexes

R7 - Recognize and identify the extracellular cells and structures of organs representative of the anatomical-functional systems of the human body, with methods of digital microscopy and histochemical staining.

Learning outcomes of the specified title

**Type of AR:** Description

- Knowing the morphology, structure and function of the skin, blood, circulatory, digestive, locomotive, reproductive, excretor and respiratory systems; endocrine system, immune system and central and peripheral nervous system. Growth, maturation and aging of different devices and systems. Homeostasis. Adaptation to the environment

- Recognizing with macroscopic, microscopic and imaging techniques the morphology and structure of tissue, organs and systems

- Understanding and recognizing the normal structure and function of the human body, at the molecular, cellular, tissue, organic and systems levels, at the different stages of life and in both sexes

R8 - Apply the knowledge acquired to solve practical problems on the identification of cells, tissues and organs of the human body in a functional context during its differentiation, maintenance and renewal, during its adaptive, defensive and regenerative responses, and during aging.

Learning outcomes of the specified title

**Type of AR:** Description

- Knowing the morphology, structure and function of the skin, blood, circulatory, digestive, locomotive, reproductive, excretor and respiratory systems; endocrine system, immune system and central and peripheral nervous system. Growth, maturation and aging of different devices and systems. Homeostasis. Adaptation to the environment

- Recognizing with macroscopic, microscopic and imaging techniques the morphology and structure of tissue, organs and systems

- Understanding and recognizing the normal structure and function of the human body, at the molecular, cellular, tissue, organic and systems levels, at the different stages of life and in both sexes

## Assessment system

**Modalidad presencial**

| Assessed learning outcomes | Granted percentage | Assessment tool |
|---|---|---|
| R1, R2, R3, R6, R7, R8 | 70,00% | Tests |
| R1, R2, R3, R6, R7, R8 | 10,00% | Work |
| R1, R2, R3, R6, R7, R8 | 5,00% | Participation in class |
| R7 | 15,00% | Practice exam |

**Observations**

In order to obtain a passing grade, it will be necessary to have reached a minimum score of 5 out of 10, both in the Theoretical Exam (multiple choice tests; UCV-TEST application) and in the Practical Exam. The attendance to the practical exam is compulsory in order to be able to take the practical exam.
This course does not contain the possibility of “SINGLE EVALUATION”, since continuous activities are carried out throughout the course.
It is not allowed the use of AI for the realization of activities, except in the cases indicated by the teacher.

**MENTION OF DISTINCTION:**
In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with Distinction) may be awarded. Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.

## Actividades formativas

The methodologies to be used so that the students reach the expected learning outcomes will be the following:

M1 Masterclass

M2 Problems resolution and practical cases

M3 Virtual simulations

M4 Content presentations by teacher

M12 Tests to understand the level of knowledge acquirance and skills

**IN-CLASS TRAINING ACTIVITIES**

| ACTVITY | RELATIONSHIP WITH THE COURSE LEARNING OUTCOMES | METHODOLOGY | HOURS | ECTS |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Theory class | R1, R2, R3, R6, R7, R8 | Masterclass<br>Problems resolution and practical cases<br>Virtual simulations<br>Content presentations by teacher | 36,00 | 1,44 |
| Seminar and group practices | R1, R2, R3, R6, R7, R8 | Masterclass<br>Problems resolution and practical cases<br>Virtual simulations<br>Content presentations by teacher | 9,00 | 0,36 |
| Practices in small groups | R1, R2, R3, R6, R7, R8 | Masterclass<br>Problems resolution and practical cases<br>Virtual simulations<br>Content presentations by teacher | 4,50 | 0,18 |
| Tutoring | R1, R2, R3, R6, R7, R8 | Problems resolution and practical cases | 1,50 | 0,06 |
| Evaluation | R1, R2, R3, R6, R7, R8 | Problems resolution and practical cases<br>Tests to understand the level of knowledge acquirance and skills | 1,50 | 0,06 |
| **TOTAL** | | | **52,50** | **2,10** |

## TRAINING ACTIVITIES OF AUTONOMOUS WORK

| ACTVITY | RELATIONSHIP WITH THE COURSE LEARNING OUTCOMES | METHODOLOGY | HOURS | ECTS |
|---|---|---|---|---|
| No attendance | R1, R2, R3, R6, R7, R8 | Problems resolution and practical cases<br>Virtual simulations | 97,50 | 3,90 |
| **TOTAL** | | | **97,50** | **3,90** |

## Description of contents

Descripción de contenidos necesarios para la adquisición de los resultados de aprendizaje.

### Theoretical content:

| Block of content | Contents |
|---|---|
| BLOCK I: GENERAL HUMAN HISTOLOGY | Unit 1. Concept and historical evolution of Histology. Tissue and organ concept. Classification of tissues. Origin and body distribution of tissues.<br><br>Unit 2. Epithelial tissue.<br>Concept, varieties and distribution. General characteristics. Lining and glandular epithelia.<br><br>Unit 3. Connective tissue.<br>Generalities and adipose tissue. Cell concept and composition. Extracellular matrix.<br><br>Unit 4. Cartilaginous tissue and Bone.<br>Hyaline cartilaginous tissue. Fibrous cartilaginous tissue. Elastic cartilaginous tissue. Direct or membranous ossification. Indirect or chondral ossification. Diaphyseal ossification. Epiphyseal ossification.<br><br>Unit 5. Blood and Bone Marrow.<br>Structure and function of the erythrocyte, platelets, granulocytes, monocytes and lymphocytes. Hematopoiesis: Erythropoiesis, megakaryopoiesis, plaquetogenesis, granulopoiesis and monopoiesis and Lymphopoiesis T and B (Histology MO in topic 11).<br><br>Unit 6. Muscle tissue.<br>Smooth muscle. Cardiac muscle. Skeletal muscle.<br><br>Unit 7. Nervous Tissue: CNS and SNP.<br>Neuron. Glial cells of the CNS. Ependymal cells. Glial cells of the SNP. |

BLOCK II: SPECIAL HUMAN HISTOLOGY

Unit 8. Skin and nails.
Epidermis and dermis. Hair follicles. Sebaceous glands. Sweat glands. Nail.

Unit 9. Breast.
Adolescence, Adult and Menopause. Immunophenotypes and Biomarkers.

Unit 10. Heart, Arteries, Veins and Microvascularization.
Endocardium, Myocardium, Epicardium. Arteries and Veins. Arteriovenous anastomosis. Cup holder systems. Lymphatic vascular system.

Unit 11. Lymphoid system I.
Bone Marrow (see topic 6), Thymus and Lymph Nodes.

Unit 12. Lymphoid system II.
Spleen, MALT and Appendix.

Unit 13. Head and neck I.
Oral cavity, Nose, Paranasal Sinuses, Salivary glands, Larynx and Pharynx (see topic 15).

Unit 14. Head and neck II.
Eye, Ear and Temporal Bone.
Sclerocorneal, uveal and retinal layers. External, middle and internal ear.

Unit 15. Respiratory System and Serous Membranes.
Nostrils. Paranasal sinuses Nasopharynx. Larynx. Windpipe. Main bronchi. Socket.

Unit 16. Alimentary Tract I.
Esophagus, Stomach, Small Intestine, Colon, Appendix and Anal Canal.

Unit 17. Alimentary Tract II.
Liver, Bile Ducts and Pancreas.

Topic 18. Genitourinary System I.
Kidney and Renal Pelvis. Ureter and Bladder.

Unit 19. Genitourinary System II.
Testis and Ductal Excretory System. Penis and distal urethra. Prostate.

Unit 20. Female Genital System.
Vulva, Vagina, Uterus, Fallopian tubes. Ovary. Placenta.

Topic 21. Endocrine System I.
Hypothalamic pituitary axis. Pituitary and Pineal Gland.

Topic 22. Endocrine System II.
Thyroid, Parathyroid and Adrenal Glands. Diffuse Endocrine System and Paraganglia.

BLOCK III: SEMINARS

**Evolve Resource for Netter's Essential Histology, 3rd Edition.**By William K. Ovalle and Patrick C.Nahirney. ISBN: 9780323759830(https://lticontenttool.elsevier.com/#/library/)
**Digital Histology Lab**1. The Cell - Lip2. The Cell - Squamous Cell Carcinoma, Skin3. Epithelium and Exocrine Glands - Pancreas4. Epithelium and Exocrine Glands - Ductal Carcinoma of Breast5. Connective Tissue - Tonsil6. Connective Tissue - Fibrosarcoma7. Muscle Tissue - Stylopharyngeous XS LS8. Muscle Tissue - Acute Myocardial Infarction9. Nervous Tissue - Spinal Cord10. Nervous Tissue - Alzheimer Disease (Bielschowsky Silver)11. Cartilage and Bone - Knee Joint, Rabbit12. Cartilage and Bone - Osteosarcoma13. Blood and Bone Marrow - Marrow Smear14. Blood and Bone Marrow - Multiple Myeloma15. Cardiovascular System - Heart Wall16. Cardiovascular System - Atherosclerosis, Coronary Artery17. Lymphoid System - Thymus18. Lymphoid System - Hodgkin Disease, Lymph Node19. Endocrine System - Pituitary20. Endocrine System - Multinodular Goiter, Thyroid Gland21. Integumentary System - Thick Skin22. Integumentary System - Basal Cell Carcinoma, Skin23. Upper Digestive System - Post Tongue24. Upper Digestive System - Squamous Cell Carcinoma, Esophagus25. Lower Digestive System - Recto Anal Junction26. Lower Digestive System - Colorectal Adenocarcinoma27. Liver, Gall Bladder, and Exocrine Pancreas - Pancreas Liver28. Liver, Gall Bladder, and Exocrine Pancreas - Fatty Liver Disease (Hepatic Steatosis)29. Respiratory System - Lung30. Respiratory System - Staphylococcal Bronchopneumonia, Lung31. Urinary System - Kidney32. Urinary System - Diabetic Glomerulosclerosis, Kidney (PAS)33. Male Reproductive System - Penis34. Male Reproductive System - Benign Prostatic Hypertrophy35. Female Reproductive System - Ovary36. Female Reproductive System - Cervical Cancer (Invasive Squamous Cell Carcinoma)37. Eye and Adnexa - Eyeball38. Eye and Adnexa - Uveal Melanoma39. Special Sense - External Ear

Temporary organization of learning:

| Block of content | Sessions | Hours |
|---|---|---|
| BLOCK I: GENERAL HUMAN HISTOLOGY | 8 | 16,00 |
| BLOCK II: SPECIAL HUMAN HISTOLOGY | 13 | 26,00 |
| BLOCK III: SEMINARS | 5 | 10,50 |

## References

**Ross. Histologia: Texto y atlas: Correlacion con biologia molecular y celular.**
8ª ed. Wojciech Pawlina (2020).

**Evolve Resource for Netter's Essential Histology, 3rd Edition 2021.**
By William K. Ovalle, PhD and Patrick C. Nahirney, PhD

**Netter. Flashcards de histología, Edition 2, 2021.**
By William K. Ovalle, PhD and Patrick C. Nahirney, PhD

**Don MacCallum's Michigan Histology.**
2nd edition, 2017. Donald K. MacCallum, Michael Hortsch & Stephen C. Kempf.
https://histology.medicine.umich.edu/full-slide-list
(Histology at the University of Michigan: The Department of Cell & Developmental Biology at the University of Michigan Medical School)

**Histology at the University of Michigan** (Medical School).
The Department of Cell & Developmental Biology at the University of Michigan Medical School provides digital microscopy resources for the study of cells. A full list of slides
https://histology.sites.uofmhosting.net/