UAB
Universitat Autònoma de Barcelona

Morphology

Code: 102678
ECTS Credits: 9

2024/2025

Degree	Type	Year
2502445 Veterinary Medicine	FB	2

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no official prerequisites, although it is convenient that the student has passed the subjects of Morphology I and Structure and Function of the Nervous System, which are taught in the second semester of the first year of the Veterinary Degree. The contents of Morphology II are complemented with those of the subject of Physiology, which is taught simultaneously in the second year of the degree.

Objectives and Contextualisation

Morphology II is a basic subject of the second year of the Veterinary Degree that contributes to getting the student to know the structure, organization, and function of the organs, apparatuses, and systems that compose the animal organism, both throughout the development of the individual as in his adult stage. In particular, the subject of

Morphology II focuses on the study of the circulatory system and the respiratory, digestive, urinary and genital apparatuses, in addition to the endocrine glands. It is explained from the development of the different organs until its anatomy in the adult. The subjects of Morphology I, Structure and Function of the Nervous System and Physiology complement the contents of the structure and function of the set of apparatuses and systems of the body of the animal.

The formative objectives of the subject are:

- To understand the development of the circulatory system, the respiratory, digestive and urogenital apparatuses, and the endocrine glands, the basic concepts of the mechanisms that control their embryonic development as well as the etiology and the meaning of developmental anomalies.

- To understand the form, the macroscopic structure, the disposition and function of the organs that make up the circulatory system, the respiratory, digestive and urogenital apparatuses, and the endocrine glands, in the different species of veterinary interest.

- To understand the microscopic structure of the different organs that compose the circulatory system, the respiratory, digestive and urogenital systems, and the endocrine glands, in the different species of veterinary interest.

- To use the embryological, histological and anatomical terminology correctly and appropriately.

- To use embryological, anatomical and histological knowledge as a basis for the study of other preclinical and clinical subjects. This knowledge will form the basis for the correct understanding of physiology and pathology.

- To access and to use critically information sources on embryology, anatomy, and histology in an autonomously and adequately.

Competences

- Comunicar la informació obtinguda durant l'exercici professional de manera fluïda, oralment i per escrit, amb altres col·legues, autoritats i la societat en general.
- Demonstrate knowledge and understanding of structural and functional disorders of the animal organism.
- Demonstrate knowledge and understanding of the structure and functions of healthy animals.
- Work effectively in single or multidisciplinary teams and show respect, appreciation and sensitivity for the work of others.

Learning Outcomes

1. Communicate information obtained during professional exercise in a fluid manner, orally and in writing, with other colleagues, authorities and society in general.
2. Construct different animal organs by selecting and relating basic tissues.
3. Describe changes to tissue components of organs and relate them with the functionality of the organ.
4. Explain the basic concepts of the mechanisms that control the embryonic processes.
5. Explain the etiology and meaning of developmental anomalies.
6. Microscopically identify animal tissues and organs.
7. Recognise and explain the form, structure, layout and relationships of the organs, apparatus and systems of animals of veterinary interest.
8. Recognise and explain the origin and organisation of the structure of animals during their development.
9. Relate the composition and the structure of tissues with their functions.
10. Use anatomical and embryologic knowledge to solve problems of a veterinary nature.

11. Use the correct and suitable embryologic and anatomical terminology.
12. Work effectively in single or multidisciplinary teams and show respect, appreciation and sensitivity for the work of others.

Content

The theoretical and practical contents are detailed below:

Circulatory System

• General aspects. Heart: ontogeny. Modifications of foetal circulation at birth. Congenital anomalies.

• Adult heart. Pericardium. The microscopic structure of the heart: fibrous and membranous structures, myocardium. Cardiac morphology. Compartments, openings, and valves. Relationships of the heart inside the thorax. Microscopic structure.

• Vascularization and innervation of the heart. Conducting autonomic system of the heart.

• Development of the intraembryonic circulatory system. Arterial and venous systems: aortic arches, dorsal aortas, cardinal, supracardinal and subcardinal veins. Modifications of circulation at birth. Congenital anomalies.

• Lymphatic organs. Nodules and lymphatic vessels. Lymphatic centers. Thoracic duct, spleen, and thymus: development, morphology and microscopic structure; Comparative anatomy.

General splanchnology

• Primitive intestine. Development and parts: Anterior, middle and posterior intestines. Celoma and derived cavities. Derived organs from the cranial portion of the anterior primitive intestine: pharyngeal pouches.

• Pharyngeal clefts and visceral arches. Development of the thyroid and parathyroid glands. Facial development. Oran and nasal cavities, and palate. Microscopic structure. Congenital anomalies.

• Vascularization of the head. Lymphatic centers. Motor and sensory innervation of the head.

Endocrine glands

• Hypophysis: morphology, microscopic structure, anatomical relationships; vascularization and innervation.

• Thyroid and parathyroid: morphology, microscopic structure, anatomical relationships; vascularization and innervation.

• Adrenal glands: development, morphology, microscopic structure, anatomical relationships; vascularization and innervation. Other endocrine tissues.

Respiratory apparatus

• General aspects. Development of the caudal portion of the anterior primitive intestine: tracheobronchial diverticulum.

• Nasal cavity. Vomeronasal organ. Paranasal sinuses; Comparative anatomy. Nasopharynx, Pharyngotympanic tube, and guttural pouches. Microscopic structure.

• Larynx. Cartilages, ligaments, and muscles. Laryngeal cavity. Microscopic structure. Biomechanics of phonation. Vascularization and innervation. Comparative anatomy.

• Trachea. Lungs. Morphology and anatomical relationships. Microscopic structure. Structural organization: bronchial tree and respiratory portion. Bronchopulmonary segment. Comparative anatomy.

• Functional and nutritional vascularization of the lungs. Lymphatic nodules and vessels. Innervation. Pleura.Mediastinum. Topography ofthe thoracic cavity.

Digestive tract

• General aspects. Oral cavity. Lips, gums, hard palate, and soft palate. Microscopic structure. Intrinsic and extrinsic muscles of the tongue; vascularization and innervation.

• Masticatory apparatus. Temporomandibular join. Masticatory muscles. Teeth. Development. Morphology and microscopic structure. Classification. Dental formulas. Comparative anatomy and functional aspects.

• Salivary glands. Classification, morphology, microscopic structure and anatomical relationships. Vascularization and innervation. Comparative anatomy.
• Pharynx. Parts, microscopic structure, anatomical relationships, vascularization, and innervation. Tonsils and other lymphoid formations.

• Derivatives of the caudal portion of the anterior primitive intestine. Esophagus: development, microscopic structure, parts, relationships, vascularization and innervation, comparative anatomy. Abdominal cavity. Peritoneum: development, microscopic structure and disposition; greater omentum and minor omentum, omental bursa and omental orifice.

• Monocavitary stomach. Development, morphology, microscopic structure and anatomical relationships. Vascularization and innervation. Comparative anatomy.
• The stomach of ruminants. Development, morphology, microscopic structure and anatomical relationships. Vascularization and innervation.

• Liver. Development, morphology, microscopic structure, situation, and anatomical relationships. Biliary tract.Functionaland nutritional blood supply. Lymphocenters. Innervation. Comparative anatomy.

•Pancreas. Development,morphology, microscopic structure, situation, and anatomical relationships. Pancreatic ductal system. Vascularization and innervation. Comparative anatomy.

• Derivatives of the middle and posterior primitive intestines. Congenital abnormalities of the intestine. Small intestine: duodenum, jejunum, and ileum. Morphology, microscopic structure and anatomical relationships. Comparative anatomy.

• Large intestine: cecum, colon, and rectum. Morphology, microscopic structure, and anatomical relationships. Comparative anatomy. Anal canal and paranal sacs.
• Vascularization, lymphocenters and intestinal innervation. Comparative anatomy.

Urogenital apparatus

• General considerations. Development of the urinary apparatus: pronephros, mesonephros and metanephros, urinary tract. Congenital malformations.

• Kidneys. Morphology, situation and anatomical relations, microscopic structure. Renal pelvis. Vascularization and innervation. Comparative anatomy.

• Ureters. Urinary bladder. Urethra. Morphology, structure, situation and anatomical relationships. Vascularization and innervation. Differences between sexes. Comparative anatomy.

• Development of the gonads and genital ducts. Undifferentiated period and evolution in the male and female. Congenital malformations.

• Development of the external genitaliaof themale and female. Mechanics of testicular descent. Congenital malformations.

• Male genital organs. Testicle, epididymis and testicular investments. Morphology and microscopic structure. Deferentduct and spermatic cord. Anatomical relationships. Vascularization and innervation. Comparative anatomy.

• Accessory genital glands of the male: vesicular glands, prostate, and bulbourethral glands. Morphology, structure and anatomical relationships. Vascularization and innervation. Comparative anatomy.

• Penis and prepuce. Morphology and structure. Muscles of the penis and prepuce. Vascularization and innervation. Comparative anatomy.

• Female genital organs. Ovaries, uterine tubes, uterus, vagina, vaginal vestibule, vulva, and clitoris. Accessory glands. Morphology and microscopic structure. Comparative anatomy.

• Situation and anatomical relations of the female genital apparatus. Ligaments. Vascularization and innervation. Comparative anatomy. Perineal region. Fascias and muscles. Vascularization and innervation. Differences between sexes.

• Mammary glands: development and comparative anatomy. Description of the breast of the cow: morphology and microscopic structure. Vascularization and innervation.

Birds
• Anatomy of birds. Comparative osteology. Organs of the body cavity. Microscopic structure

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			

Laboratorial sessions.	78	3.12	1, 3, 6, 8, 7, 12, 11
Master classes.	38	1.52	2, 3, 4, 5, 6, 8, 7, 9, 10, 11
Type: Supervised			
Presentation of the subject	1	0.04	
Type: Autonomous			
Autonomous learning	103	4.12	2, 4, 6, 8, 7, 9, 12, 10, 11

The methodology used during the teaching and learning process is based on the student efficiency analysing the information that our team made available through different means. The main role of the teacher is to help the student, not only giving information, but also directing and supervising the learning process. The course is based on the following activities:

Masterclasses: The student acquires the scientific knowledge of the discipline. The student must complete this knowledge with the personal and autonomous study of the topics explained. CFor the resolution of doubts the "Campus Virtual" Forum will be used.

Practical sessions: Practical sessions approach the theoretical models to reality and reinforce, complete and allow applying the knowledge acquired in masterclasses. At the beginning of the course, the student will receive a practical guide describing the contents studied in each session. In practical sessions, the students grouped in small groups will study dissections, bones, preparations of isolated organs, models, x-rays, histological preparations, etc. Throughout the observation of these specimens, the student will acquire a three-dimensional concept of the structural disposition, required to understand, for example, the relationships among the different organs inside the body cavities, or the distribution of vessels and nerves. In practical sessions, the student will also develop manual dexterity and skills, such as curiosity and observation.

Laboratorial sessions will be carried out in the dissection and microscope rooms.

The student's learning will be monitored through different evaluative tests in continuous assessment that will take place in the dissection and microscope rooms. These tests will evaluate the understanding of practical sessions and the integration of theoretical contents acquired in master classes.

The materials used in the subject will be availableon the Moodle platform.

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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Individual controls along the course on dissection and integrated practice	10%	1	0.04	6, 7, 12, 11
Practical exam in the microscopy room	10%	1	0.04	2, 3, 6, 9
Practical exams in the dissection room	40%	1	0.04	1, 7, 11

Written exams	40%	2	0.08	2, 3, 4, 5, 6, 8, 7, 9, 10, 11

Evaluation

The evaluation will be performed continuously along the course, for the better monitoring of the teaching and learning processes, encourage the continuous effort during the semester and verify that the competences assigned to the subject are achieved. The student's final grade will be calculated from the average of all his partial grades. The course will be approved with a final grade of 5 or higher.

Continuous evaluation of the practices:

- Attendance at practical sessions will be controlled.

- There will be controls or evaluation tests throughout the semester. One control about the integrated practice of Histology and several controls of Anatomy (Kahoot at the end of the practice).

- The realization of these controls is mandatory.

- The marks obtained in these tests will represent 10% of the final grade of the subject (also for students repeating the course).

Practical exams: To achieve the aim that the student integrates the contents of the different practical blocks, two practical oral exams about the Anatomy will be performed. These are eliminatory examinations and will be carried out before each of the two scheduled partials.

- The first exam will include the circulatory system, the general splanchnology and the respiratory apparatus. It will be carried out using isolated organs and the dissections of the head and the thoracic cavity.

- The second exam will include the digestive tract, the urinary apparatus and the genital apparatus. It will be carried out using isolated organs of the different species and the dissections of the abdominal and pelvic cavities.

- The two exams will be performed in the dissection room, on the specimens used during the practical sessions. These two practical exams will represent 40% of the final grade of the subject.

- The fluid, orderly and reasoned exposure of the answers will be positively valued.

- The two exams are eliminatory, so you will need a minimum score of 4.5 points out of 10 to average with the rest of the marks and pass the subject.

Practical exam about Histology will be held in the Microscope Room. It will consist of the identification of structures and cell types of the different organs studied.

- This exam will be 10% of the final grade of the subject. A minimum score of 4.5 points out of 10 is required to average with the rest of the marks and pass the subject.

Written evaluations: Both will be carried out after the practical exams and will include the same apparatus and systems as the practical ones.

- These exams will worth 40% of the final grade of the subject.
- The grade will be weighted in relation to the number of theoretical classes (Anatomy and Histology). A minimum grade of 4.5 points out of 10 will be required in each of these exams to be able to make the average with the rest of the grades and be able to pass the subject. The theoretical examinations will allow evaluating the integration of the theoretical knowledge with those acquired in the practical sessions and the ability to analyze and relate concepts.

Students who do not pass any of the practical or theoretical exams will have the opportunity to retrieve them during the exam recovery period at the end of the semester.

Not presented students: The student who has not been made any partial exam, including theoretical or practical ones, will be considered as Not Presented. The student who made one partial exam but not further exams will be considered Failed.

This subject does not include single evaluation.

Bibliography

Textbooks of Anatomy

- Dyce, Sack i Wensing (2012): Textbook of Veterinary Anatomy. 4th Ed. Ed. Saunders Elsevier, Sant Louis, Missouri.

- Evans i de Lahunta (2013): Miller's Anatomy of the dog. 4ª Ed. Ed. Elsevier Saunders, Sant Louis, Missouri.

- König y Liebich (2005): Anatomía de los animales domésticos. Tomo 1. Aparato locomotor. Texto y atlas en color. 2ª Ed. Editorial Médica Panamericana, Madrid.

- König y Liebich (2005): Anatomía de los animales domésticos. Tomo 2. Órganos, sistema circulatorio y sistema nervioso. Texto y atlas en color. 2ª Ed. Editorial Médica Panamericana, Madrid.

- Schaller (1996): Nomenclatura anatómica veterinaria ilustrada. Ed. Acribia S.A., Zaragoza.

- *Nomina Anatomica Veterinaria* (2005): 5ª Ed. International Committee on Veterinary Gross Anatomical Nomenclature (I.C.V.G.A.N.). Disponible a http://www.wava-amav.org/indes.html.

- Constantinescu i Schaller (2012): Illustrated Veterinary Anatomical Nomenclature. 3ª Ed. Ed. Enke, Stuttgart.

Textbooks of Embryology

- Noden, D.M. y A. DeLahunta (1990): Embriología de los animales domésticos. Ed. Acribia, Zaragoza.

- Gilbert, S. F. (2005): Biología del desarrollo. 7ª Ed. Editorial medica Panamericana, Madrid.

Textbooks of Histology

- Banks (1993). Applied Veterinary Histology. 2nd Ed. Williams and Wilkins. London.

- Eurell i Frappier (2006). Dellmann's textbook of Veterinary Histology. 6th Ed.

- Kierszenbaum A.L. (2007). Histology and Cell Biology. An introduction to Pathology. Mosby Elsevier Ed.

- Kristic (1989): Los tejidos del hombre y de los mamíferos. Ed. Interamericana. Madrid

- Samuelson, D.N. Textbook of Veterinary Histology (2007) Saunders/Elsevier Ed.

Atlas of Anatomy

- Done, Goody, Evans y Stickland (2010). Atlas en color de Anatomía Veterinaria. El perro y el gato. 2ª Ed. Ed.Elsevier España, Barcelona.

- Ruberte, Sautet, Navarro, Carretero y Pons (1995): Atlas de Anatomía del perro y del gato. Vol. 1: Cabeza y Cuello. Multimédica, Sant Cugat del Vallès, Barcelona.

- Ruberte, Sautet, Navarro, Carretero y Espelt (1996): Atlas de Anatomía del perro y del gato: Vol. 2: Tórax y Miembro torácico. Multimédica. Sant Cugat del Vallès, Barcelona.

- Ruberte, Sautet, Navarro, Carretero, Manesse y Pérez-Aparicio(1998): Atlas de Anatomía del perro y del gato: Vol. 3: Abdomen, pelvis y Miembro pelviano. Multimédica. Sant Cugat del Vallès, Barcelona.

Atlas of Histology

- Bacha i Bacha (2012) Color Atlas of Veterinary Histology. 3ª Ed. Ed. Lippincott Williams & Williams, London.

- Wheater's Functional Histology: A Text and Colour Atlas (2006)(Book with CD-ROM) 5ª Ed. by Barbara Young and John W. Heath.

- DiFiore. Atlas of Histology (2013). 12ª Ed. Victor P. Erochenko. Walters Kluber Lippincott Williams & Wilkins.

Links to webs of Anatomy

- Atlas de los músculos del perro II: Cuello, tronco y cola. Cabeza.
http://veterinariavirtual.uab.es/anatomia/musculosperroII/Atlas_virtual/primera.html

- Atlas de anatomía de la cabeza del perro.
http://veterinariavirtual.uab.es/anatomia/cabezaperro/Atlas_virtual/primera.html

- Atlas de Anatomia seccional en el perro.
http://veterinariavirtual.uab.es/anatomia/anatseccional/primera.html

- Atlas de osteología de los mamíferos domésticos.
http://veterinariavirtual.uab.es/anatomia/osteologia

- Atlas de anatomía de especies silvestres de la Amazonía peruana
http://atlasanatomiaamazonia.uab.cat/

- Web de neuroanatomia: www.neuroanatomyofthedog.com

- Atles del desenvolupament embrionari preimplantacional dels mamifers domèstics. http://videosdigitals.uab.es/cr-vet/www/21197/atlas/inicio.html

Links to webs of Histology

- http://www.med.umich.edu/histology/digMicro.html. Collection of histologic preparations digitized.

- http://zyx.freeservers.com/histo/histo.htm. Histology World It is a website where you can find all kinds of information related to Histology: books, journals, publications, collections, laboratories, etc. as well as links to all other websites.

- http://www3.usal.es/histologia/. Web of the Salamanca University. Collection of histologic preparations, including self-evaluation and games.

Software

It is not necessary any special software

Language list

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	1	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	2	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	3	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	4	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	5	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	6	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	1	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	2	Catalan/Spanish	first semester	morning-mixed