

Academic Year/course: 2021/22

## 28405 - Embryology and Anatomy I

### Syllabus Information

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**Academic Year:** 2021/22

**Subject:** 28405 - Embryology and Anatomy I

**Faculty / School:** 105 - Facultad de Veterinaria

**Degree:** 451 - Degree in Veterinary Science

**ECTS:** 7.0

**Year:** 1

**Semester:** First semester

**Subject Type:** Basic Education

**Module:**

## 1. General information

### 1.1. Aims of the course

The aims of this course are to:

1. Acquire scientific and professional nomenclature and manual ability for application in their subsequent practices medical-surgical;
2. Serve as a base to study other clinical or pre-clinical subjects and for correlating the morphological data with the functional;
3. Be an essential part of the study and diagnosis of any clinical circumstance;
4. Be an instrumental part in solving functional or pathological problems;
5. Develop communication and observation skills and, therefore, to increase his or her intelligence and his or her ability to understand and have critical capacity;
6. Acquire and exercise information skills (IQ), through the virtual course Information Management in the Veterinary Degree;
7. Help to understand the organization of the living animal throughout its life cycle, as well as the interrelation of the multiple structures that study the rest of the disciplines of Anatomy;
8. Lead to know the ontogenetic history of all animals, especially domestic animals, from fertilization to death;
9. Help to understand, and then explain, the anomalies presented by the newborns, as well as their possible etiology and their possible consequences;
10. Allow to acquire a sufficiently solid base to be able to develop more easily in front of others materials;
11. Provide the basic tools for searching and managing information in any of its supports and storage and distribution media.

### 1.2. Context and importance of this course in the degree

The course, together with Embryology and Anatomy II of the second semester of the first year, aims to provide the basic knowledge of embryology and anatomy of domestic animals, contemplated in the list of competencies to be acquired by the Veterinary Graduate (Order ECI/33/2008), and which appear in the degree report of this 2 of 8 degree. The acquisition of competencies in morphology, topography and structure of organs and systems (Code: FBC05), in functioning and regulation of body apparatus and systems (Code FBC07), and in ontogenetic development, congenital anomalies and embryology applications (Code: FBC09) is explicitly contemplated.

This subject will also serve as a support for the acquisition and exercise of informational competencies (CI), through the virtual course BASIC DIGITAL COMPETITION: LEARN TO INFORM, TO CREATE AND TO COMMUNICATE DIGITALLY (basic level)

This course offers, through a common thematic thread that facilitates the elaboration of the class work, basic training in the following areas:

- **INFORMATION AND DATA PROCESSING:** to identify, locate, obtain, store, organize and analyze the digital information, evaluating its purpose and relevance.
- **COMMUNICATION AND COLLABORATION:** communicating in digital environments, sharing resources through

networked tools.

- CREATION OF CONTENTS: create and edit new content, integrate previous knowledge, know how to apply the intellectual property rights and licenses of use.
- SECURITY: protection of information and personal data, security measures, responsible and safe use

### 1.3. Recommendations to take this course

There are no specific requirements, but training is required in health sciences subjects.

It is advisable to have general knowledge of the structure of domestic mammals and to be, to some extent, familiar with their management and functional activity.

A sufficient knowledge of English is desirable to facilitate broad access to bibliographic sources.

## 2. Learning goals

### 2.1. Competences

On successful completion of this course, students will be able to:

1. Internalize, evaluate and use the morphology, topography and structure of the organs and systems in order to perform the veterinarian's own activities.
2. Understand and integrate the operation and regulation of the body systems and appliances necessary for the performance of the profession.
3. Assimilate, interpret and make use of knowledge related to ontogenetic development, anomalies, etc. and applications of embryology in their professional work.
4. Search, manage and use information at a basic level

### 2.2. Learning goals

If students complete the course successfully, they should be able to:

1. Identify and describe the embryonic stages and structures of the germinal and embryonic periods of the development of domestic animals, including ectoderm, mesoderm, endoderm and line derivatives germinal. Detail the structural changes and describe the principles governing the formation of the main apparatuses and body systems.
2. Explain and value the concepts related to the processes and mechanisms that control the development and to the embryo manipulation procedures. Describe, compare and differentiate placentation in the different domestic animals
3. Describe and understand the embryonic development of structures belonging to the locomotor apparatus and explain the embryonic origin of their congenital anomalies
4. Locate, name and be able to make a morphofunctional description of the elements and details of the bone and joint structure of the neck, trunk and extremities of domestic animals, recognizing these elements and their details in the radiographic images, as well as their projections and palpable reliefs on the surface of the animal.
5. Locate, name and be able to make a morphofunctional description of the muscles, nerves, vessels and other auxiliary elements related to, or delimited by, the apparatus locomotor of the neck, trunk and extremities of domestic animals, as well as their projections and situations or useful on the surface of the animal.
6. Search, manage and use information at a basic level.

### 2.3. Importance of learning goals

The knowledge of Morphology, together with that of Physiology, constitute the fundamental base on which the formation of the veterinarian is based, being more useful and necessary in the measure in which this learning is closely linked and oriented to the necessities imposed by the pathology, the clinic and the surgery. Specifically, Anatomy and Embryology are an essential part of this base, as they serve as the backbone of the structural and functional knowledge of organisms and facilitate subsequent learning of other subjects such as Pathology, Clinical Propaedeutics, Clinical Medicine and Surgery, Radiology and Image Diagnosis, Obstetrics and Reproduction, Hygiene and Food Inspection and others.

## 3. Assessment (1st and 2nd call)

### 3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The evaluation activities will be carried out in the classroom unless, due to the health situation, the provisions issued by the competent authorities and by the University of Zaragoza, they have to be carried out telematically.

## Assessment activities

The student must demonstrate that has achieved the expected learning outcomes by means of the following evaluation activities

1: Theoretical Exam (50% of final grade).

Design: written exam in the classroom. It includes multiple choice questions, short answer questions, essay-type questions, and images. In order to pass it is necessary to obtain at least half of the score.

2: Practical Exam (40% of the final grade).

Design: In the dissection room with the osteological material studied and the animals dissected in the course of the practices, a long series of structures and details that the student will have to identify and name in a questionnaire. In order to overcome it, it is necessary to obtain at least two thirds of the score.

3: Preparation of a paper (9% of the final grade)

Design: Preparation, delivery in pdf format (maximum 5 pages, including figures) and defense of a work in small groups (maximum: 3 students). The works will deal with topics proposed by the teaching staff referring to specific and complementary aspects of osteology and dissection not dealt with in the regulated of the programming of the practices or an anatomical study of the different anatomical regions of birds, exotic species, wild mammals, laboratory animals, etc.). The teaching staff will supervise the personal work of the students, showing them the procedures to follow to analyse and study the assigned material and guiding them in the search of information, in their assessment, and in relation to learning outcomes corresponding to competences informational.

4. Virtual Course on Information Management in the Veterinary Degree (1% of the final grade)

### Valuation criteria and requirement levels

- Coherence and quality of information (25%)
- Clarity of exposure (25%)
- Degree of elaboration of the presentation (25%)
- Degree of personal involvement and contributions to the design and execution of the work (15%)
- Quality of the search and management of bibliographic and informational sources (10%)

The works will be evaluated by the academic staff.

### Marking system:

According to the national regulation Law 1025/2003, 5th of September which lays down the European system of credits and marking system for the university degree.

0-4,9: FAIL.

5,0-6,9: PASS

7,0-8,9: GOOD (NT).

9,0-10: EXCELLENT (SB).

As established in article 158 of the Statutes of the University of Zaragoza, the provisional grades will be shown at least during the next 7 days and the students will be detailed on the date, time and place provided for that purpose.

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The teaching activities will be carried out in the classroom unless, due to the health situation, the provisions issued by the competent authorities and by the University of Zaragoza, they have to be carried out telematically.

The teaching methodology is structured in three levels: theoretical classes, lab sessions and practical works/tasks development based on lab sessions.

### 4.2. Learning tasks

There will be the following activities:

**Theoretical classes** (50%): 35 hours. The main course contents are presented.

**Practical classes** with the active involvement of the student (31.5 hours). Different lab sessions are carried out. Notes for each lab session where the different activities are planned will be available before the session

**Tutorial work for the preparation of internships** (5 %): 3.5 hours including instruction issue specific dissecting awarded, performing / exhibition with colleagues

**Virtual Course Information Management in the Degree of Veterinary Medicine.**

- Tutorship. Students may solve any questions they might have about unclear contents of the course
- Evaluation: Set of theoretical and practical work and delivery of written works.

### 4.3. Syllabus

## Theoretical classes

### Session TITLE

1. Introduction. Concept, Purpose and content of the Veterinary Anatomy. Division of Anatomy Study. Techniques. Organs and systems.
2. General Embryology. Concept, purpose and content of the Veterinary Embryology. Stages of prenatal development: germinal, embryonic and foetal periods.
3. Gametogenesis. General concepts. Spermatogenesis: phases, multiplication, maturation, transformation and release of sperm. Comparative morphology of sperm and abnormal forms. Oogenesis: phases, types of eggs. Egg birds.
4. Fertilization. Main events and consequences of fertilization. Polyspermia. Parthenogenesis. Fertilization in birds. Segmentation, morulation and blastulation in mammals and birds. Hatching of the blastocyst.
5. Gastrulation in mammals and birds. Embryonic or organogenetic period. Derivatives of the germ layers: ectoblast, mesoblast and endoblast. Neurulation and training of sketches or primary organs. Appearance of body shape.
6. Introduction to the development and establishment of the Central and Peripheral Nervous Systems.
7. Cardiovascular system. Development of heart and vascular system. Description of the fetal circulation and changes that occur at birth. Congenital malformations.
8. Splanchnology. General concepts. Anterior, middle and posterior intestine. Derivatives of the pharynx: pharyngeal pouches. Gill slits.
9. Visceral arches. Language development and thyroid gland. Development and training of the lungs and pleura. Congenital malformations.
10. Respiratory System. Development of the skull and face. Palate development and training of oral and nasal cavities. Congenital malformations.
11. Concepts and mechanisms of development: differentiation, growth, cell migration, morphogenic movements, cellular adhesiveness and affinity. Cell death.
12. Control and genetic regulation of embryonic development. Transgenesis. In vitro fertilization. Embryo transfer. Handling blastocyst. Cloning.
13. Nidation or implantation. Embryonic appendages: yolk sac, amnion, allantois and chorion. Embryonic and extraembryonic circulation.
14. Placentation. Anatomical and histological classification of placentas. Umbilical cord and chorionic sac. Evolution and characteristics of the chorionic sac in the different domestic species.
15. Locomotor System. Definition and parts. Phylogeny and ontogeny. Osteology: osteogenesis and their types. Bone structural organization. Bone biomechanics.
16. Arthrology: artrogénesis. Types of joints and elements that constitute them. Ligaments. Joint biomechanics.
17. Miology: myogenesis. Muscles: types and classification. Structural organization of striated skeletal muscle. Auxiliary locomotor structures.
18. Axil region. Embryonic development. Deformities and congenital anomalies. Regionalization and vertebral formula. Joints of the spine. Biomechanics and joint study: comparative anatomy.
19. Autochthonous muscles of the spine: classification. Muscles of the medial and lateral tracts: a comparative study. Tail muscles. Ventral neck muscles: classification and comparative study. Neck fascias.
20. Thorax: comparative study. Joints and muscles: classification and biomechanics. Diaphragm muscle: development, description and comparative study.
21. Abdominal muscles: development and classification. Linea alba, prepubic tendon and inguinal ligament. Inguinal canal. Comparative study.
22. Composition of a spinal nerve. Regional differences between the spinal nerves. Sensory and motor innervation of the neck, trunk and tail.
23. Vascularization of the neck, trunk and tail. Large vessels: aorta, vena cava and parietal branches. Azygos vein and its branches. Lymphatic system ontogeny. Lymph nodes and lymphatic vessels of the axial region: thoracic duct and chyle cistern.
24. Forelimb. Phylogeny and ontogeny of members: congenital anomalies.
25. Scapular fixator muscles: classification. Situation, relationships and movements of the scapula. Shoulder joint: articular surfaces, ligaments and movements. Motor muscles of the humerus: classification and comparative study.
26. Elbow joint: articular surfaces, ligaments and movements. Elbow motor muscles: functional classification and comparative study. Carpal joints and phalanges: comparative study of the articular surfaces, ligaments and movements.
27. Forearm muscles: functional classification and comparative study. Hand muscles: functional classification and comparative study.
28. Innervation of the forelimb: comparative study of the brachial plexus and its collateral and terminal branches.

29. Arterial, venous and lymphatic vascularization of the thoracic limb: a comparative study. Fascias and elastic and corneas structures of the extremities. Fingernail, unguicula and ungula. The hooves of ruminants and pigs. The helmet of the equines: morphology and functional organization.
30. Hindlimb. General concepts. Pelvic girdle: a comparative study. Hip joint: articular surfaces ligaments and movements. Femur skeletal muscles: classification.
31. Femur motor muscles: Comparative study.
32. Knee and proximal tibiofibular joints: articular surfaces, ligaments and movements. Motor muscles of the knee joint: classification and comparative study.
33. Comparative study of foot joints: articular surfaces, ligaments and movements. Leg and foot muscles.
34. Innervation of the hindlimb: comparative study of the lumbosacral plexus and its collateral and terminal branches.
35. Arterial, venous and lymphatic vascularization of the hindlimb: comparative study.

Fascias and synovial of the hindlimb: comparative study.

### **Practical classes**

Practice

Number	Title
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|----|---|
| 1. | Anatomical planes. Nomenclature. Types of bones and basic structure. Spine vertebra type. |
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Vertebral formula.

1. Cervical vertebrae: a comparative study. Nuchal skull face. Hyoid. Radiographs of the neck.
2. Thoracic vertebrae. Ribs and sternum. Lumbar, sacrum and caudal vertebrae. Introduction to the pelvis. Radiographs of the chest, abdomen and pelvis.
3. Scapula and humerus. Comparative study. Radiographs of back and arm.
4. Radius, Ulna, Carpus and Metacarpus. Radiographic study.
5. Phalanges. Helmet and hoofs. Anatomical and Radiographic study.
6. Innominate bone, femur and patella. Recognition of details and lateral radiographs.
7. Tibia, fibula and tarsus. Recognition of details and radiographs.
8. Surface Anatomy and Body Regions. Skin lifting of the neck, back, arm, thorax and abdomen region. Recognition of surface structures: superficial fascia.
9. Dissection of the lateral aspect of the neck: superficial, medium and deep planes.
10. Dissection of the ventral aspect of the neck: superficial and deep planes. Visceral cavity of the neck: limits, content and deep fascia of the neck.
11. Lateral planes of the thorax and abdomen I (disinsertion of the latissimus dorsi and trapezius). Epiaxial muscles of the spine. Intercostal muscles
12. Lateral planes of the thorax and abdomen II (disinsertion of the external and internal oblique muscles of the abdomen). Surface plane of the back and arm. Superficial dissection of pectoral muscles.
13. Dissection of the lateral aspect of back, shoulder and arm. Pectoral muscles.
14. Dissection of the armpit: arm brachial plexus and arterial and venous branches.
15. Dissection of the dorsal aspect of the forearm and hand.
16. Dissection of the caudal aspect of the forearm and hand.
17. Dissection of the rump and hip. Recognition of the important details for surgery in the region.
18. Dissection of the lateral and medial thigh. Recognition of the important details for surgery in the region.
19. Dissection of the knee and lateral leg. Recognition of the important details for surgery in the region.
20. Dissection of the caudal aspect of the leg and foot. Recognition of the important details for surgery in the region:

## **4.4. Course planning and calendar**

The course calendar is defined by the Veterinary faculty calendar.

## **4.5. Bibliography and recommended resources**

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28405>