

## 28405 - Embryology and Anatomy I

### Información del Plan Docente

Academic Year	2017/18
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.Introduction**

#### **1.2.Recommendations to take this course**

#### **1.3.Context and importance of this course in the degree**

#### **1.4.Activities and key dates**

### **2.Learning goals**

#### **2.1.Learning goals**

#### **2.2.Importance of learning goals**

### **3.Aims of the course and competences**

#### **3.1.Aims of the course**

#### **3.2.Competences**

### **4.Assessment (1st and 2nd call)**

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

### **5.Methodology, learning tasks, syllabus and resources**

#### **5.1.Methodological overview**

The teaching methodology is structured in three levels: theoretical classes where student participation is encouraged; also lab sessions and practical works/tasks development based on lab sessions are proposed.

## 28405 - Embryology and Anatomy I

### 5.2.Learning tasks

There will be the following activities:

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

5.2.2. 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

5.2.3. Tutored Work Practices Preparation (5 %): 3.5 hours including instruction issue specific dissecting awarded, performing / exhibition with colleagues

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

5.2.5. Tutorship. Students may solve any questions they might have about unclear contents of the course

5.2.6. Evaluation: Set of theoretical and practical work and delivery of written works.

### 5.3.Syllabus

Theoretical classes

Session

TITLE

1

Introduction. Concept, Purpose and content of the Veterinary Anatomy.  
Division of Anatomy Study Techniques.  
Organs and systems.

## 28405 - Embryology and Anatomy I

General Embriology. Concept, purpose and content of the Veterinary Embryology. Stages of prenatal development: germinal, embryonic and foetal periods

2

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

3

Fertilization. Main events and consequences of fertilization. Polyspermy. Parthenogenesis. Fertilization in birds. Segmentation, morulation and blastulation in mammals and birds. Hatching of the blastocyst

4

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

5

Introduction to the development and establishment of the Central and Peripheral Nervous Systems

6

Cardiovascular system. Development of heart and vascular system. Description of the fetal circulation and changes that occur at birth. Congenital malformations

7

Splanchnology. General concepts. Anterior, middle and posterior intestine. Derivatives of the pharynx: pharyngeal pouches. Gill slits

## 28405 - Embryology and Anatomy I

- 8 Visceral arches. Language development and thyroid gland. Development and training of the lungs and pleura. Congenital malformations
- 9 Respiratory System. Development of the skull and face. Palate development and training of oral and nasal cavities. Congenital malformations
- 10 Concepts and mechanisms of development: differentiation, growth, cell migration, morphogenic movements, cellular adhesiveness and affinity. Cell death.
- 11 Control and genetic regulation of embryonic development. Transgenesis. *In vitro* fertilization. Embryo transfer. Handling blastocyst. Cloning
- 12 Nidation or implantation. Embryonic appendages: yolk sac, amnion, allantois and chorion. Embryonic and extraembryonic circulation
- 13 Placentation. Anatomical and histological classification of placentas. Umbilical cord and chorionic sac. Evolution and characteristics of the chorionic sac in the different domestic species
- 14 Locomotor System. Definition and parts. Phylogeny and ontogeny. Osteology: osteogenesis and their types. Bone structural organization. Bone

## 28405 - Embryology and Anatomy I

biomechanics.

15

Arthrology: artrogénesis. Types of joints and elements that constitute them. Ligaments. Joint biomechanics.

16

Miology: myogenesis. Muscles: types and classification. Structural organization of striated skeletal muscle. Auxiliary locomotor structures

17

Axil region. Embryonic development. Deformities and congenital anomalies. Regionalization and vertebral formula. Joints of the spine. Biomechanics and joint study: comparative anatomy.

18

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

19

Thorax: comparative study. Joints and muscles: classification and biomechanics. Diaphragm muscle: development, description and comparative study

20

Abdominal muscles: development and classification. Linea alba, prepubic tendon and inguinal ligament. Inguinal canal. Comparative study.

21

Composition of a spinal nerve. Regional differences between the spinal nerves. Sensory and motor innervation of the neck, trunk and tail.

## 28405 - Embryology and Anatomy I

- 22 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
- 23 Forelimb. Phylogeny and ontogeny of members: congenital anomalies
- 24 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
- 25 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
- 26 Forearm muscles: functional classification and comparative study. Hand muscles: functional classification and comparative study
- 27 Innervation of the forelimb: comparative study of the brachial plexus and its collateral and terminal branches
- 28 Arterial, venous and lymphatic vascularization of the thoracic limb: a comparative study. Fascias and forelimb subcutaneous synovial comparative study
- 29 Elastic and corneal structures of the extremities. Fingernail, ungula and ungulates. The hoof of ruminants and

## 28405 - Embryology and Anatomy I

swine. The hull of 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&shy;

Practical classes

PRACTICA NUMBER

TITLE

## 28405 - Embryology and Anatomy I

- 1 Anatomical planes. Nomenclature. Types of bones and basic structure. Spine vertebra type. Vertebral formula
- 2 Cervical vertebrae: a comparative study. Nuchal skull face. Hyoid. Radiographs of the neck
- 3 Thoracic vertebrae. Ribs and sternum. Lumbar, sacrum and caudal vertebrae. Introduction to the pelvis. Radiographs of the chest, abdomen and pelvis
- 4 Scapula and humerus. Comparative study. Radiographs of back and arm
- 5 Radius, Ulna, Carpus and Metacarpus. Radiographic study
- 6 Phalanges. Hoof and hoofs. Anatomical and Radiographic study
- 7 Innominate bone, femur and patella. Recognition of details and lateral radiographs
- 8 Tibia, fibula and tarsus. Recognition of details and radiographs
- 9 Surface Anatomy and Body Regions. Skin lifting of the neck, back, arm, thorax and abdomen region. Recognition of surface structures: superficial fascia.
- 10 Dissection of the lateral aspect of the neck: superficial, medium and deep planes.



## 28405 - Embryology and Anatomy I

- 11 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.
- 12 Lateral planes of the thorax and abdomen I (disinsertion of the latissimus dorsi and trapezius). Epiaxial muscles of the spine. Intercostal muscles
- 13 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
- 14 Dissection of the lateral aspect of back, shoulder and arm. Pectoral muscles
- 15 Dissection of the armpit: arm brachial plexus and arterial and venous branches
- 16 Dissection of the dorsal aspect of the forearm and hand
- 17 Dissection of the caudal aspect of the forearm and hand
- 18 Dissection of the rump and hip. Recognition of the important details for surgery in the region
- 19 Dissection of the lateral and medial thigh. Recognition of the important details for surgery in the region
- 20 Dissection of the knee and lateral leg. Recognition of the important details for surgery in the region

Dissection of the caudal aspect of the leg and foot. Recognition of the important details for surgery in the region

### 5.4.Course planning and calendar

The course calendar is defined by the Veterinary faculty calendar.

### 5.5.Bibliography and recommended resources

[BB: Bibliografía básica / BC: Bibliografía complementaria]

- [BB] Atlas en color de anatomía veterinaria . El perro y el gato / Stanley H. Done ... [et al.] . 2ª ed. Barcelona [etc.] : Elsevier , cop. 2010
- [BB] Colour atlas of veterinary anatomy. Vol.3, The dog & cat / Stanley H. Done [et al.] . London : Mosby-Wolfe, cop. 1996
- [BB] Embriología y anatomía veterinaria. Vol. 1, Embriología general, conceptos generales del aparato locomotor, región axil, miembro torácico y miembro pelviano / Salvador Climent Peris ... [et al.]. Zaragoza : Acribia, D. L. 2012
- [BB] Embriología y anatomía veterinaria. Vol. 2, Cabeza, aparatos respiratorio, digestivo y urogenital, snc y órganos de los sentidos / Salvador Climent Peris ... [et al.]. Zaragoza : Acribia, D. L. 2013
- [BB] Manual de anatomía y embriología de los animales domésticos : conceptos básicos y datos aplicativos. Aparato locomotor : conceptos generales y región axil / Salvador Climent Peris [et al.] . Zaragoza : Acribia, 2002
- [BB] Manual de anatomía y embriología de los animales domésticos : conceptos básicos y datos aplicativos. Cabeza, aparato respiratorio, aparato digestivo, aparato urogenital / Salvador Climent Peris ... [et al.] . Zaragoza : Acribia, 2005
- [BB] Manual de anatomía y embriología de los animales domésticos : conceptos básicos y datos aplicativos. Embriología general / Salvador Climent Peris [et al.] . Zaragoza : Acribia, 1998
- [BB] Manual de anatomía y embriología de los animales domésticos : conceptos básicos y datos aplicativos. Miembro torácico y miembro pelviano, sistema circulatorio, esqueleto de la cabeza / Salvador Climent Peris [et al.] . Zaragoza : Acribia, 2004
- [BB] Manual de anatomía y embriología de los animales domésticos : conceptos básicos y datos aplicativos. Sistema nervioso central y órganos de los sentidos / Salvador Climent Peris [et al.] . Zaragoza : Acribia, 1998
- [BB] Protocolos de disección : anatomía del perro / Julio Gil ... [et al.] . - 3ª ed. Zaragoza: Servet, 2012
- [BB] Schebitz, Horst. Atlas de anatomía radiográfica canina y felina / H. Schebitz, H. Wilkens ; [traducción Silvia Serdá Cabre, Maite LLoria LLacer] . [1ª ed.,reimpr.] / [revisión de la edición española Fidel San Román Ascaso,Pilar LLorens Pena] Barcelona : Grass, 1994
- [BC] Atlas de anatomía del perro y el gato. Vol.1, Cabeza y cuello / J. Ruberte [et al.] . S. Cugat del Vallés (Barcelona) : Multimédica, D.L. 199 [Atlas]
- [BC] Atlas de anatomía del perro y el gato. Vol.2, Tórax y miembro torácico / J. Ruberte [et al.] . S. Cugat del Vallés (Barcelona) : Multimédica, D.L. 199 [Atlas]
- [BC] Atlas de anatomía del perro y el gato. Vol.3, Abdomen, pelvis y miembro pelviano / J. Ruberte [et al.] . S. Cugat del Vallés (Barcelona) : Multimédica, D.L. 199
- [BC] [Atlas] - Clinical radiology of the horse / Janet A. Butler ... [et al.] . 3th ed. Iowa : Wiley-Blackwell, cop. 2008
- [BC] Berg, Rolf. Anatomía topográfica y aplicada de los animales domésticos / Rolf Berg ; [traducción de M.E. Salamanca] . 2a ed. Madrid : Editorial AC, 1987 [Anatomía aplicada]
- [BC] Boyd, Jack S.. Atlas en color de anatomía clínica del perro y el gato / J.S. Boyd, C. Paterson con la colaboración de A. H. May ; [traducción Sol Montes Relanzón] ; [revisión científica, Fidel San Román Ascaso] . 2ª ed. Barcelona : Elsevier, 2008
- [BC] Dyce, Keith M.. Anatomía veterinaria / K.M. Dyce, W.O. Sack, C.J.G. Wensing ; traducción Juan Roberto Palacios Martínez ; revisión técnica, Santiago Aja Guardiola . 4ª ed. México : Manual Moderno, 2012

## 28405 - Embryology and Anatomy I

- [BC] [Embriología] - Sadler, T. W.. Embriología médica [12ª ed.] / T. W. Sadler ; ilustraciones, Jill Leland ; imágenes, Susan L. Sadler- Redmon ; microfotografías, Kathy Tosney ; ecografías, Nancy Chescheir, Hytham Imseis ; [traducción, Juan Roberto Palacios Martínez ; revisión técnica, María Dolores González Vidal]. 12ª ed. Hospitalet de Llobregat : Wolters Kluwer : Lippincott Williams& Wilkins, D.L. 2012 [ ]
- [BC] Evans, Howard E.. Disección del perro / Howard E. Evans, Alexander de Lahunta ; traducción, Santiago Aja Guardiola . 5a. ed. México [etc.] : McGraw-Hill Interamericana, cop. 2002
- [BC] Gilbert, Scott F.. Biología del desarrollo / Scott F. Gilbert ; con un capítulo sobre el desarrollo de plantas por Susan R. Singer. . 7ª ed. Buenos Aires [etc.] : Editorial Médica Panamericana, 2005 [Embriología]
- [BC] Habel, Robert E.. Anatomía veterinaria aplicada / Robert E. Habel ; traducido de la 2a. ed. norteamericana por Salvador Climent Peris . Zaragoza : Acribia, imp. 1988 [Embriología]
- [BC] Kealy, J. Kevin. Diagnostic radiology of the dog and cat / J. Kevin Kealy . 2nd. ed. Philadelphia [etc.] : W.B. Saunders, 1987 [Atlas]
- [BC] McLelland, John. Atlas en color de anatomía de las aves / John MacLelland ; prólogo, Julián J. Baumel . Madrid [etc.] : Interamericana:McGraw-Hill, D.L. 1992 [Atlas]
- [BC] Miller, Malcom E.. Miller's anatomy of the dog / Howard E. Evans . 3nd. ed. Philadelphia [etc.] : W.B. Saunders, 1993
- [BC] Noden, Drew M.. Embriología de los animales domésticos : mecanismos de desarrollo y malformaciones / Drew M. Noden, Alexander de Lahunta ; traducido por Narciso Murillo Ferrol . 1ª reimpr. Zaragoza : Acribia, D. L. 2001
- [BC] Nomenclatura anatómica veterinaria ilustrada / editor Oskar Schaller ; con la colaboración de Georghé M. Constantinescu[ et al.] ; traducción de Salvador Climent Peris [ et al.] . Zaragoza : Acribia, D.L. 1996
- [BC] Popesko, Peter. Atlas de anatomía topográfica de los animales domésticos. Tomo I, Cabeza y cuello / Peter Popesko ; [revisión científica, Jan Kolda,Karol J. Fried] ; [colaboradores, A. I. Akajevskij, Jurajsutta, Rudolf Skarda] ; [revisión científica de la obra española, Víctor Götzens García] . 2ª ed. Barcelona : Masson, 1998
- [BC] Popesko, Peter. Atlas de anatomía topográfica de los animales domésticos. TomoII, Tronco / Peter Popesko ; [revisión científica, Jan Kolda,Karol J. Fried] ; [colaboradores, A. I. Akajevskij, Jurajsutta, Rudolf Skarda] ; [revisión científica de la obra española, Víctor Götzens García] . 2ª ed. Barcelona : Masson, 1998
- [BC] Popesko, Peter. Atlas de anatomía topográfica de los animales domésticos. TomoIII, Pelvis y miembros / Peter Popesko ; [revisión científica, Jan Kolda,Karol J. Fried] ; [colaboradores, A. I. Akajevskij, Jurajsutta, Rudolf Skarda] ; [revisión científica de la obra española, Víctor Götzens García] . 2ª ed. Barcelona : Masson, 1998
- [BC] Sisson, Septimus. Anatomía de los animales domésticos / Sisson, Grossman, Robert Getty ; coordinación editorial, Cynthia Ellenport Rosenbaum, N.G. Ghoshal, Daniel Hillmann ; [traducido por R. Martín Roldán,M. Illera Martín, M. J. Blánquez Layunta]. 5a ed., reimpr. Barcelona [etc.] : Masson, 1998
- [BC] The anatomy of the domestic animals. Vol.1, The locomotor system of the domestic mammals / by Richard Nickel ... [et al.]; translation by Walter G. Siller and William M. Stokoe . [1st ed.] Berlin : Paul Parey, 1986
- [BC] The anatomy of the domestic animals. Vol.2, The viscera of the domestic mammals / by August Schummer and Richard Nickel . 2nd rev. ed. / translation and revision by Wolfgang Otto Sack Berlin : Paul Parey, 1979
- [BC] The anatomy of the domestic animals. Vol.5, Anatomy of the domestic birds / R. Nickel, A. Schummer, E. Seifel ; translation by W. G. Siller and P. A. L. Wight . [1st ed.] Berlin : Paul Parey, 1977

### Listado de URL

- Anillo Digital Docente [<http://add.unizar.es/add/area/index.php>]