

# BIO-1410: ANATOMY & PHYSIOLOGY OF DOMESTIC ANIMALS I

## Cuyahoga Community College

**Viewing: BIO-1410 : Anatomy & Physiology of Domestic Animals I**

**Board of Trustees:**

January 2021

**Academic Term:**

Fall 2021

**Subject Code**

BIO - Biology

**Course Number:**

1410

**Title:**

Anatomy & Physiology of Domestic Animals I

**Catalog Description:**

Explores the comparative anatomy and physiology of the canine, feline, equine, bovine, ovine, porcine and avian species. Focuses on cellular biology, tissues and membranes, and the integumentary, skeletal, muscular, nervous, endocrine, and circulatory systems with emphasis on species variations. Laboratory includes preserved and fresh specimens, models, microscopic observations, and audio/visual aids.

**Credit Hour(s):**

4

**Lecture Hour(s):**

3

**Lab Hour(s):**

2

**Other Hour(s):**

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## Requisites

**Prerequisite and Corequisite**

BIO-1100 Introduction to Biological Chemistry or concurrent enrollment; or CHEM-1010 Introduction to Inorganic Chemistry, or concurrent enrollment; or departmental approval: comparable knowledge or skills.

Note: Due to COVID-19 safety guidelines, lab space in this course is currently limited. Students who have been accepted to the Veterinary Technology program are given priority for enrollment in this class. Students who have not yet been admitted to the program will be admitted on a space available basis. Please contact the Veterinary Technology program director for permission to enroll in this course.

## Outcomes

**Course Outcome(s):**

Apply the fundamental knowledge of the skeletal and muscular system of the canine, feline, equine, bovine, ovine, porcine and avian species when working in biomedical research, veterinary medicine, animal agriculture or other advanced scientific study.

**Objective(s):**

1. Describe the microscopic and gross anatomical features of bone, cartilage and ligaments, including the healing mechanism.
  2. Identify the major anatomical structures of the axial and appendicular skeleton and locate clinically important landmarks.
  3. Recognize the microscopic features of the various types of muscle tissues.
  4. Describe the physiology of muscle contraction.
  5. Identify the major muscle groups of the head, neck, trunk and limbs and note important clinical landmarks.
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**Course Outcome(s):**

Apply fundamental knowledge of the nervous system of the canine, feline, equine, bovine, ovine, porcine and avian species when working in biomedical research, veterinary medicine, animal agriculture or other advanced scientific study.

**Objective(s):**

1. Describe the structure and function of the spinal cord, including sensory and motor pathways.
2. Differentiate between the sympathetic and parasympathetic nervous system anatomy, physiology, neurotransmitters, and innervation.
3. Describe the anatomy and physiology of the special senses, with special emphasis on the eye and the ear.
4. Describe the anatomical and functional differences between neurons and neuroglia.
5. Differentiate between motor, sensory and internuncial neurons as well as their functions and roles in the reflex arc.
6. Describe nerve impulse generation and the events that occur at the synapse.
7. Identify the anatomical structures of the brain and describe their functions.

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**Course Outcome(s):**

Apply fundamental knowledge of the circulatory system of the canine, feline, equine, bovine, ovine, porcine and avian species when working in biomedical research, veterinary medicine, animal agriculture or other advanced scientific study.

**Objective(s):**

1. Describe the normal anatomy of the heart.
2. Describe the physiology of the cardiac cycle.
3. Trace the normal circulatory route through the heart.
4. Describe the principles of electrocardiography and identify the major features of an ECG.
5. Describe the structure and function of the blood vessels.
6. Explain the principles of blood pressure, tissue perfusion, and peripheral resistance.

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**Course Outcome(s):**

Apply fundamental knowledge of cellular biology, tissues and membranes, and the integumentary, and endocrine system of the canine, feline, equine, bovine, ovine, porcine and avian species when working in biomedical research, veterinary medicine, animal agriculture or other advanced scientific study.

**Objective(s):**

1. Describe the structure and function of cells and their organelles.
2. Describe the four types of tissues.
3. Describe the structure and functions of the skin, hair, claws, nails and horns.
4. Identify the external and internal anatomical structures of the hoof.
5. Describe the general actions of hormones on the target organs, including secondary messengers, cellular receptors, and feedback mechanisms.
6. Describe the various endocrine tissues, their hormones, target organs, and target organ responses, including clinical applications.

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**Methods of Evaluation:**

1. Objective lecture examinations
2. Practical laboratory examinations
3. Lecture quizzes
4. Laboratory quizzes
5. Participation
6. Journal article summary
7. Research paper

**Course Content Outline:**

1. Chemical Basis for Life
  - a. Organic Molecules
  - b. Carbohydrates
  - c. Lipids
  - d. Proteins
  - e. Nucleic Acids

2. Cellular biology
  - a. Cell structures
    - i. plasma membrane
    - ii. cytoplasm/organelles
    - iii. nucleus
  - b. Cell physiology
    - i. pinocytosis/phagocytosis
    - ii. diffusion
    - iii. osmosis
    - iv. active transport
3. Tissues
  - a. epithelium
  - b. connective tissue
  - c. muscle tissue
  - d. nervous tissue
  - e. membranes
    - i. mucous
    - ii. serous
    - iii. synovial
    - iv. cutaneous
4. Integumentary system
  - a. Structure of the skin
    - i. epidermis
    - ii. dermis
  - b. Epidermal outgrowths
    - i. hooves
    - ii. claws
    - iii. horns
5. Skeletal system
  - a. Bone/cartilage microscopic anatomy
    - i. compact bone/Haversian system
    - ii. cancellous bone/trabeculae
  - b. Bone gross anatomy
    - i. cancellous bone
    - ii. compact bone
    - iii. long bones
    - iv. flat bones
    - v. irregular bones
  - c. ligaments
  - d. Bone homeostasis
    - i. hormones
    - ii. vitamins
    - iii. minerals
  - e. Bone growth
    - i. growth in length/epiphyseal plate
    - ii. growth in diameter/osteoblasts
    - iii. osteocytes
    - iv. bone healing
  - f. Skeletal anatomy
    - i. axial skeleton
    - ii. appendicular skeleton
    - iii. clinically important landmarks
6. Muscular system
  - a. Microscopic anatomy
    - i. skeletal muscle
    - ii. smooth muscle
    - iii. cardiac muscle
    - iv. sarcomeres
  - b. Muscle physiology

- i. depolarization
- ii. repolarization
- iii. neurotransmitters
- iv. actin
- v. myosin
- vi. troponin
- vii. tropomyosin
- viii. roles of Na, K, and Ca
- ix. contraction/sliding filament theory
- x. relaxation
- xi. tonus
- xii. clonus
- xiii. tetany
- xiv. oxygen debt/lactic acid
- c. Muscle anatomy
  - i. head, neck, and trunk
    - 1. Major muscle groups
    - 2. muscle actions
    - 3. origins/insertions
    - 4. clinical landmarks
  - ii. pectoral limb
    - 1. major muscle groups
    - 2. muscle actions
    - 3. origins/insertions
    - 4. clinical landmarks
    - 5. stay apparatus (equine)
  - iii. pelvic limb
    - 1. major muscle groups
    - 2. muscle actions
    - 3. origins/insertions
    - 4. clinical landmarks
    - 5. stay apparatus (equine)
- 7. Nervous system
  - a. Cellular anatomy
    - i. neurons
    - ii. neuroglia
    - iii. soma
    - iv. dendrite
    - v. axon
    - vi. neurolemma
    - vii. Schwann cell
    - viii. myelin sheath
    - ix. node of Ranvier
    - x. motor end plate
    - xi. motor neurons
    - xii. sensory neurons
    - xiii. internuncial neurons
  - b. Neuron physiology
    - i. membrane potential
    - ii. resting potential
    - iii. threshold stimulus
    - iv. action potential
    - v. refractory periods
    - vi. "all-or-none" principle
    - vii. synapses
    - viii. conduction velocity
    - ix. inhibition/excitation
    - x. neurotransmitters

- c. Central nervous system
    - i. definitions
      - 1. nucleus
      - 2. ganglion
      - 3. tract
      - 4. nerve
    - ii. brain
      - 1. lobes
      - 2. fissures
      - 3. sulci/gyri
      - 4. cerebrum
      - 5. cerebellum
      - 6. thalamus
      - 7. hypothalamus
      - 8. pons
      - 9. medulla
      - 10. CSF/choroid plexus
      - 11. ventricles
      - 12. cranial nerves
      - 13. meninges
    - iii. spinal cord
      - 1. white matter
      - 2. gray matter
      - 3. sensory pathways
      - 4. motor pathways
      - 5. reflex arc
  - d. peripheral nervous system
    - i. endoneurium
    - ii. perineurium
    - iii. epineurium
    - iv. receptor
    - v. dorsal root
    - vi. dorsal root ganglion
    - vii. dorsal gray horn
    - viii. ventral gray horn
    - ix. ventral root
    - x. effector
    - xi. spinal reflexes
    - xii. nerve plexuses
    - xiii. clinical applications
  - e. Autonomic nervous system
    - i. sympathetic vs. parasympathetic
    - ii. preganglionic/postganglionic fibers
    - iii. neurotransmitters
    - iv. sympathetic physiology
    - v. parasympathetic physiology
    - vi. comparison of sympathetic and parasympathetic structure and function
  - f. Special senses
    - i. olfaction
    - ii. gustation
    - iii. vision
      - 1. structure of the eye
      - 2. physiology of the eye
    - iv. hearing and equilibrium
      - 1. structure of the ear
      - 2. function of the ear
    - v. proprioception
8. Endocrine system

- a. Hormones
    - i. basic chemistry
    - ii. mechanisms of action
  - b. Hypothalamus
  - c. Pituitary
  - d. Thyroid
  - e. Parathyroid
  - f. Adrenal
  - g. Pancreas
  - h. Pineal
  - i. Thymus
  - j. Kidney
  - k. Skin
  - l. Prostaglandins
9. Circulatory system
- a. Heart
    - i. anatomy
    - ii. physiology of contraction
    - iii. circulation
    - iv. nervous and endocrine regulation
    - v. ECG
  - b. Vascular anatomy
    - i. arteries
    - ii. veins
    - iii. capillaries
    - iv. regulation of blood flow

## Resources

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Hermanson, John W. and Alexander De Lahunta. *Miller's Anatomy of the Dog*. 5th ed. St. Louis, MO: Elsevier, 2019.

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Clayton, Hillary M., Flood, Peter F., and Rosenstein, Diana S. *Clinical Anatomy of the Horse*. 1st ed. St. Louis, MO: Mosby, 2005.

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"Reece, W. O. and Rowe, E. W." *Functional Anatomy and Physiology of Domestic Animals*. 5th. Ames , Iowa; Wiley Blackwell, , 2017. June 2017.

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## Resources Other

University of Minnesota Veterinary Anatomy Website:  
<http://vanat.cvm.umn.edu/about.html> accessed on 12/2/2019

## Instructional Services

### OAN Number:

Ohio Transfer 36 TMNS

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