Basic Veterinary Subjects

VETERINARY ANATOMY AND HISTOLOGY

Course Structure - at a Glance

CODE	COURSE TITLE	CREDITS
VAN 601	COMPARATIVE OSTEOLOGY AND ARTHROLOGY	1+2
VAN 602	COMPARATIVE SPLANCHNOLOGY	2+2
VAN 603	MYOLOGY, ANGIOLOGY, NEUROLOGY AND AESTHESIOLOGY OF OX	1+3
VAN 604	GROSS ANATOMICAL TECHNIQUES	0+2
VAN 605	THEORY AND PRACTICE OF HISTOLOGICAL AND HISTOCHEMICAL TECHNIQUES	1+2
VAN 606	GENERAL HISTOLOGY AND ULTRASTRUCTURE	3+1
VAN 607	SYSTEMIC HISTOLOGY AND ULTRASTRUCTURE	3+1
VAN 608	DEVELOPMENTAL ANATOMY	3+1
VAN 691	MASTER'S SEMINAR	1+0
VAN 699	MASTER'S RESEARCH	20
VAN 701	MYOLOGY, ANGIOLOGY, NEUROLOGY AND AESTHESIOLOGY OF EQUINE, CANINE AND PORCINE	0+3
VAN 702	PRINCIPLES AND APPLICATIONS OF BIOMECHANICS	2+0
VAN 703	AVIAN ANATOMY	1+2
VAN 704	NEUROANATOMY	3+1
VAN 705	ENDOCRINE ANATOMY	2+1
VAN 706	THEORY AND APPLICATIONS OF ELECTRON MICROSCOPE	2+1
VAN 707	HISTOENZYMOLOGY AND IMMUNOCYTOCHEMISTRY	2+1
VAN 708	APPLIED EMBRYOLOGY AND TERATOLOGY	1+2
VAN 709	FUNCTIONAL VETERINARY ANATOMY	2+0
VAN 710	GROSS ANATOMY OF LABORATORY ANIMALS	1+1
VAN 790	SPECIAL PROBLEM	0+2
VAN 791	DOCTORAL SEMINAR I	1+0
VAN 792	DOCTORAL SEMINAR II	1+0
VAN 799	DOCTORAL RESEARCH	45

VETERINARY ANATOMY AND HISTOLOGY

Course Contents

VAN 601:COMPARATIVE OSTEOLOGY AND ARTHROLOGY **1+2**

Objective : To make a student well versed with the bones and joints of different domestic animals.

Theory

UNIT I : Technical terms, structure, chemical composition and classification of bones.

UNIT II : Bones of appendicular skeleton of ox as a type and their comparison with those of horse, dog, pig and poultry.

UNIT III : Bones of axial skeleton of ox as a type and their comparison with those of horse, dog, pig and poultry.

UNIT IV : Classification and detailed study of different joints of the body.

UNIT V : Study the various indices for estimating race, sex and age of different animals. Basics of biomechanics of the locomotor system. Radiography of normal and developing bones.

Practical : Demonstration of all bones and dissection of joints of buffalo/Cattle.

Suggested Readings

Dyce KM, Sack WO & Wensing CJG. 1996. *Text Book of Veterinary*

Anatomy. WB Saunders. Nickel R, Schumer A, Seiferle E, Freewin J & Wills KH. 1986. *The*

Locomotor System of Domestic Mammals. Verlag Paul Parey. Sisson S & Grossman JD. 1975. *The Anatomy of the Domestic Animals.* Vols. I, II. WB Saunders.

VAN 602: COMPARATIVE SPLANCHNOLOGY **2+2**

Objective : To give a detailed overview of different systems constituting splanchnology.

Theory

UNIT I: Descriptive anatomy of various organs of digestive system and associated glands of ox and their comparison with those of horse, dog, pig and poultry. Study of formation of thoracic, abdominal and pelvic cavities; reflection of these cavities.

UNIT II: Study of various organs/structures and associated glands constituting the respiratory system of ox and their comparison with those of horse, dog, pig and poultry.

UNIT III: Detailed study of organs and associated glands comprising the urinary system of ox as a type and their comparison with those of horse, dog, pig and poultry.

UNIT IV: Complete study of various organs and associated glands of male and female genital systems.

UNIT V: Surgical sites for various operations and clinically significant areas for performing auscultation, percussion and for carrying out surgical procedures such as laryngotomy, oesophagotomy, gastrotomy, rumenotomy, cystotomy, urethrotomy, caesarian section, exploratory laparotomy, mammectomy, thoracotomy, thoracocentesis etc.

Practical

Demonstration of structure and placement of organs in body cavities of all the animals.

VAN 603: MYOLOGY, ANGIOLOGY, NEUROLOGY AND AESTHESIOLOGY OF OX **1+3**

Objective : To give a thorough knowledge about the muscles, course of blood vessels and nerves of the body in addition to various organs of circulatory, nervous and sensory systems of ox as a type animal.

Theory

UNIT I: Classification of muscle fibres. Origin, insertion and relations of muscles of different body parts.

UNIT II: Topographic anatomy of the vascular system comprising of heart, arteries, veins and lymphatics.

UNIT III: Study of various components of central nervous system, peripheral nervous system and autonomic nervous system.

UNIT IV: Complete study of the gross anatomy of various sense organs.

UNIT V: Study of different nerve blocks, intravenous sites and enucleation of eye ball.

Practical

Dissection of heart, different vessels, brain, cranial nerves, brachial plexuses and lumbo-sacral plexus. Dissection of eye, ear, hoof and horn of buffalo/cattle.

VAN 604: GROSS ANATOMICAL TECHNIQUES 0+2

Objective: Hands-on training for preparation of gross anatomical specimens.

Practical

Embalming fluids, embalming of animals, maceration and preparation of skeletons. Gross staining of brain sections. Demonstration of sites of ossifications. Preparation of transparent specimens, preparation of casts of various organs, blood vessels and ducts etc.

VAN 605: THEORY AND PRACTICE OF HISTOLOGICAL AND HISTOCHEMICAL TECHNIQUES 1+2

Objective : To give exposure to methods of processing the tissues for research and teaching purposes.

Theory

UNIT I: Preparation of tissues for light microscopy using different fixatives.

UNIT II: Different staining methods for routine light microscopy.

UNIT III: Frozen sectioning techniques and staining methods for enzymes, carbohydrates, lipids, proteins, pigments etc.

UNIT IV: Silver staining techniques for nervous tissue.

Practical

Study of different techniques for collection, fixation and processing of animal tissues; preparation of paraffin and frozen sections; handling and care of microtomes. Demonstration of staining of carbohydrates, lipids, proteins, nucleic acids and enzymes.

VAN 606: GENERAL HISTOLOGY AND ULTRASTRUCTURE 3+1

Objective: To understand basic principles of light microscopy and light and ultrastructure of four basic tissues.

Theory

UNIT I:Light and ultrastructural details of animal cell.

UNIT II:Light and ultrastructural details of epithelial tissue.

UNIT III:Light and ultrastructural details of muscular tissue.

UNIT IV : Light and ultrastructural details of connective tissue.

UNIT V : Light and ultrastructural details of nervous tissue.

Practical

Demonstration of different components of cells and intercellular substances of the above referred tissues by special staining through the use of light, phase contrast, dark field, fluorescent and electron microscopes.

VAN 607: SYSTEMIC HISTOLOGY AND ULTRASTRUCTURE **3+1**

Objective: To understand and identify arrangement of four basic tissues in organs of different body systems.

Theory

UNIT I: Light and ultra structure of different organs of digestive system of ruminants with differential features among domestic animals.

UNIT II: Light and ultra structure of different organs of respiratory, lymphoid and cardiovascular systems.

UNIT III : Light and ultra structure of different organs of urino-genital systems.

UNIT IV : Light and ultra structure of different sense organs and nervous system.

Practical

Study of histological structure of organs of digestive, respiratory, urinary, genital and cardiovascular systems of buffalo, horse and dog/cat.

VAN 608: **DEVELOPMENTAL ANATOMY** **3+1**

Objective : To understand the developmental processes of different body systems at various stages of pregnancy.

Theory

UNIT I: Gametogenesis, fertilization, cleavage and gastrulation.

UNIT II : Development of foetal membranes and placenta in domestic animals.

UNIT III : Histogenesis of nervous system, sense organs, endocrine organs and cardiovascular system.

UNIT IV : Embryonic development of digestive, respiratory, uro-genital and musculoskeletal system.

Practical

Study of serial sections of the chick and pig embryos at different stages of development.

VAN 701: **MYOLOGY, ANGIOLOGY, NEUROLOGY AND AESTHESIOLOGY OF EQUINE, CANINE AND PORCINE** **0+3**

Objective : To teach students about anatomy of muscles, blood vessels, nervous tissue and sense organs in equine, canine and porcine.

Practical

Dissection of different body regions with respect to muscles, blood vessels and nerves; and see the topographic positioning of different organs in different body cavities in equine, canine and porcine.

Suggested Readings

Selected articles from journals.

VAN 702: **PRINCIPLES AND APPLICATIONS OF BIOMECHANICS** **2+0**

Objective : To sensitize the student about the importance of biomechanics.

Theory

UNIT I: Biomechanics, its definition and scope with reference to anatomy and physiology of domestic animals and musculo-skeletal dynamics.

UNIT II: Locomotion and clinical applications. Biomechanics of cortical and trabecular bones.

UNIT III : Biomechanics of fracture fixation. Instrumentation and techniques in locomotion and their applications in lameness.

Suggested Readings

Selected articles from journals.

VAN 703: **AVIAN ANATOMY** **1+2**

Objective: To give detailed overview of poultry anatomy.

Theory

UNIT I : The study of the gross features of different body systems of domestic fowl.

UNIT II : The study of microscopic features of different body systems of domestic fowl.

Practical

Dissection and demonstration of various body systems of fowl and turkey. Microscopic examination of slides of various organ systems of fowl.

Suggested Readings

Selected articles from journals.

VAN 704: **NEUROANATOMY** **3+1**

Objective: To provide in-depth knowledge of nervous system.

Theory

UNIT I : The gross and microscopic anatomy of the brain and spinal cord.

UNIT II : Study of various cranial and spinal nerves along with their associated nuclei and ganglia. Motor and sensory pathways, different ascending and descending tracts of brain and spinal cord and autonomic nervous system.

Practical

Gross dissection and microscopic examination of the brain and spinal cord; demonstration of the nerves, nerve plexuses, ganglia of cranial importance, study of the serial sections of the brain and spinal cord in domestic animals.

Suggested Readings

Selected articles from journals.

VAN 705: **ENDOCRINE ANATOMY** **2+1**

Objective : To project the importance and details of endocrine glands.

Theory

UNIT I : Advanced gross and microscopic anatomy of the hypothalamus and pituitary gland.

UNIT II : Advanced gross and microscopic anatomy of the thyroid, parathyroid and thymus.

UNIT III : Advanced gross and microscopic anatomy of the adrenal glands, islets of Langerhans, pineal body and other tissues associated with endocrine secretions.

Practical

Demonstration of the topographic anatomy in the embalmed specimens and microscopic examination of the endocrine glands of ruminants.

Suggested Readings

Selected articles from journals.

VAN 706 THEORY AND APPLICATIONS OF ELECTRON 2+1

MICROSCOPE

Objective : To give an overview of the electron microscope.

Theory

UNIT I : Introduction and principles of electron microscopy.

UNIT II : Methods for transmission electron microscopy.

UNIT III : Methods for scanning electron microscopy.

Practical

Preparation of blocks and demonstration of various techniques used for carrying out TEM and SEM.

Suggested Readings

Selected articles from journals.

VAN 707: HISTOENZYMOLOGY ANDIMMUNOCYTOCHEMISTRY 2+1

Objective: To give a student hands-on practice for various advanced histoenzymic and histochemical techniques.

Theory

UNIT I : Classification of enzymes - Principles of enzymes histochemistry methods.

UNIT II : Substrates -combination-coupling azo-dye methods -capture reagents.

UNIT III : Localization of enzymes and controls in enzyme histochemistry.

UNIT IV : Fluorescence microscopy in enzyme histochemistry. Immunohistochemistry- principles and techniques.

Practical

Preparation of fixatives and buffers used in histochemistry. Methods of preparations and microscopical examination of routine and special preparations showing different cell organelles and inclusions. Methods for tryptophan-SS, SH groups; Glycogen-glycoproteins; Mucopolysaccharides and lipids. Methods and identification of alkaline and acid phosphatases -succinic dehydrogenase, cytochrome- oxidase, choline-esterase, catecholamines by fluorescence microscopy. Immunohistochemistry - principles and techniques.

Suggested Readings

Selected articles from journals.

VAN 708: APPLIED EMBRYOLOGY AND TERATOLOGY 1+2

Objective: To apprise the students about the current trends in developmental processes.

Theory

UNIT I : Principles of experimental embryology and teratology.

UNIT II : Factors affecting the developmental mechanisms of embryo.

UNIT III : Use of organizers implants, chemical and hormonal preparations in the developmental models and available literature on teratogenic experimentation.

Practical

Collection and study of various teratological specimens from domestic animals. Class discussions on experimental models and available literature on teratogenic experimentation.

Suggested Readings

Selected articles from journals.

VAN 709: **FUNCTIONAL VETERINARY ANATOMY** **2+0**

Objective :To make the student understand the functional anatomy of various organs/systems in relation to structure.

Theory

UNIT I

The relationship of structure to form and function.

UNIT II

The relationship of structure for adaptation and behaviour.

UNIT III

Relationship of structure in relation to clinical conditions/ applications.

Suggested Readings

Selected articles from journals.

VAN 710: **GROSS ANATOMY OF LABORATORY ANIMALS** **1+1**

Objective: To give an overview of different body systems of laboratory animals.

Theory

UNIT I

Study of different organs of digestive system of different laboratory animals.

UNIT II

Detailed study of urinary, male and female reproductive systems of different laboratory animals.

UNIT III

Complete study of respiratory system of different laboratory animals

UNIT IV

Study of organs of circulation and nervous system of different laboratory animals.

UNIT V

Descriptive anatomy of endocrine glands of different laboratory animals.

Practical

Demonstration of placement and relations of different organs in the body cavities of different laboratory animals.

Suggested Readings

Papesko P, Rajtova V & Horak J. 2002. *A Colour Atlas of Anatomy of Small Laboratory Animals: Rabbit, Guinea Pig.* 2nd Ed. Wolfe Publ.

VAN 790: SPECIAL PROBLEM **0+2**

Objective: To provide expertise in handling practical research problem(s).

Practical

Short research problem(s) involving contemporary issues and research techniques.