VETERINARY PATHOLOGY

<u>Course Structure – at a Glance</u>

CODE	COURSE TITLE	CREDITS
VPP 601	GENERAL PATHOLOGY	2+1
VPP 602	TECHNIQUES IN PATHOLOGY	1+1
VPP 603	ANIMAL ONCOLOGY	1+1
VPP 604	CLINICAL PATHOLOGY	1+2
VPP 605	NECROPSY PROCEDURES AND INTERPRETATIONS –I	0+1
VPP 606	NECROPSY PROCEDURES AND INTERPRETATIONS –II	0+1
VPP 607	SYSTEMIC PATHOLOGY	2+1
VPP 608	PATHOLOGY OF INFECTIOUS DISEASES OF DOMESTIC ANIMALS	2+1
VPP 609	TOXICOPATHOLOGY	2+1
VPP 610	AVIAN PATHOLOGY	2+1
VPP 611	PATHOLOGY OF LABORATORY ANIMALS, FISH AND WILD ANIMALS	2+1
VPP 612	VETEROLEGAL PATHOLOGY	1+0
VPP 691	MASTER'S SEMINAR	1+0
VPP 699	MASTER'S RESEARCH	20
VPP 701	PATHOLOGY OF NUTRITIONAL AND METABOLIC DISTURBANCES	2+1
VPP 702	ADVANCES IN TOXICOPATHOLOGY	2+1
VPP 703	ADVANCES IN DIAGNOSTIC PATHOLOGY	1+2
VPP 704	ULTRASTRUCTURAL PATHOLOGY	1+1
VPP 705	IMMUNOPATHOLOGY	2+1
VPP 706	PATHOLOGY OF IMPORTANT AND EMERGING DISEASES OF PETS AND LIVESTOCK	1+1
VPP 707	ADVANCES IN AVIAN PATHOLOGY	2+1
VPP 708	PATHOLOGY OF FUNGAL DISEASES	2+1
VPP 709	MOLECULAR PATHOLOGY OF CELL INJURY	2+1
VPP 710	EXPERIMENTAL PATHOLOGY	1+1
VPP 790	SPECIAL PROBLEM	0+2
VPP 791	DOCTORAL SEMINAR I	1+0
VPP 792	DOCTORAL SEMINAR II	1+0
VPP 799	DOCTORAL RESEARCH	45

VETERINARY PATHOLOGY

Course Contents

VPP 601 GENERAL PATHOLOGY

2+1

Objective

To acquaint students with different types of degenerations, cell injuries caused by different types of irritants and inflammation.

Theory

UNIT I

Introduction and history of pathology, principles of pathology including etiology, course and termination of disease.

UNIT II

Advanced study of various degenerations, infiltrations, necrosis, endogenous and exogenous pigmentations.

UNIT III

Circulatory and growth disturbances. Reversible and irreversible cell injury.

UNIT IV

Inflammation including vascular and cellular alterations with emphasis on chemical mediators. Hypersentivity and immune mediated mechanisms, Mechanism of healing and fever.

Practical

To study the gross and microscopic changes in degenerations, infiltrations, pigmentations, circulatory and growth disturbances and different types of necrosis in different tissues of domestic animals. Study of gross and histopathological features of different types of inflammation.

Suggested Readings

McGavin MD & Zachary JF. 2006. Pathologic Basis of Veterinary Diseases. 4th Ed. Elsevier

Vegad JL. 2007. Text Book of Veterinary General Pathology. 2nd Ed. International Book Distr.

VPP 602 TECHNIQUES IN PATHOLOGY

1+1

Objective

To acquaint students with different techniques used frequently in Veterinary Pathology.

Theory

<u>UNIT I</u>

Basic histopathological techniques, collection of tissues, fixation, processing and section cutting, staining by routine and special methods.

UNIT II

Principles of dark ground, phase contrast and fluorescent microscopy and micrometry.

UNIT III

Histochemical techniques for demonstration of fat, glycogen and fibrous connective tissue, mucopolysaccharides and common enzymes.

Practical

Collection of tissues for histopathological, histochemical, toxic, bacterial and viral examination. Use of different fixatives for preservation of museum specimens. Application of different techniques- histopathological, cryosectioning, micrometry, routine and special staining. Demonstration of different inclusions, bacteria and fungi in tissues. Histochemical techniques to demonstrate different tissue constituents.

Suggested Readings

Culling CFA. 1969. *Handbook of Histological Techniques*. Butter Worths. Lillie RD. 1965. *Histopathologic Techniques and Practical Histo-chemistry*. 3rd Ed. McGraw-Hill.

VPP 603 ANIMAL ONCOLOGY

1+1

Objective

To acquaint students with different types of neoplasms of domestic animals, their nature, cause, pathology and diagnosis.

Theory

UNIT I

Study of different neoplasms of animals including their identification, and epidemiology.

UNIT II

Etiology, histogenesis and experimental production.

UNIT III

Tumour immunology, cell cultures, transplantation and biological behaviour.

Practical

To study the gross and microscopic changes in different types of neoplasms.

Suggested Readings

Meuten DJ. 2002. *Tumors in Domestic Animals*. 4th Ed. Blackwell.

VPP 604 CLINICAL PATHOLOGY

1+2

Objective

To acquaint students with clinical alterations in blood, urine, CSF and other body fluids due to different diseases.

Theory

<u>UNIT I</u>

Study of changes in blood, urine, faeces, cerebrospinal fluid and biopsy specimens and their interpretation.

UNIT II

Exfoliative cytology, organ function tests and their interpretation.

UNIT III

Biochemical profile of blood/plasma/serum and its correlation with disease conditions in domestic animals.

Practical

Evaluation of laboratory investigations on blood, urine, faeces and biopsy specimens from natural and experimentally produced disease conditions.

Suggested Readings

Benzamin MM. 1978. *Outline of Veterinary Clinical Pathology*. 3rd Ed. Iowa State Univ. Press.

Coles EH. 1967. Veterinary Clinical Pathology. WB Saunders.

VPP 605 NECROPSY PROCEDURES AND INTERPRETATIONS-1 0+1

Objective

To acquaint students with different Post-mortem procedures in large animals and study of PM lesions in different diseases.

Practical

Detailed necropsy examination of various species of farm animals, laboratory animals and wildlife. Necropsy case presentation and report writing/protocol preparation. Collection of specimens for diagnosis of viral, bacterial, protozoan, parasitic diseases, toxic/ poisoning and for histochemistry/histopathology. Systemic examination of brain, lungs, heart, endocrine glands, lymph nodes, liver, Gastro Intestinal tract, urinary and genital systems for gross pathological and histopathological studies and correlation of the observations to diagnose the disease conditions.

Suggested Readings

Jones TC & Gleiser CA. 1954. Veterinary Necropsy Procedures. JB Lippincott.

VPP 606 NECROPSY PROCEDURES AND INTERPRETATIONS-II 0+1

Objective

To acquaint students with different Post-mortem procedures in small animals and poultry and study of PM lesions in different diseases.

Practical

Detailed necropsy examination of various species of small animals, poultry, laboratory animals and wildlife. Necropsy case presentation and report writing/protocol preparation. Collection of specimens for diagnosis of viral, bacterial, protozoan, parasitic diseases, toxic/ poisoning and for histochemistry/histopathology. Systemic examination of brain, lungs, heart, endocrine glands, lymph nodes, liver, Gastro Intestinal tract, urinary and genital systems for gross pathological and histopathological studies and correlation of the observations to diagnose the disease conditions.

Suggested Readings

Jones TC & Gleiser CA. 1954. Veterinary Necropsy Procedures. JB Lippincott.

VPP 607 SYSTEMIC PATHOLOGY 2+1

Objective

To teach the students about the different disease conditions of haemopoietic, circulatory, respiratory, digestive, urinary and genital systems, nervous, musculoskeletal, endocrine, glands and special senses.

Theory

UNIT I

An advanced study of pathological conditions affecting different organs of haemopoietic (bone marrow, blood, spleen, lymph node), circulatory (heart, blood vessels and lymph vessels). Respiratory (nasal cavity, larynx, trachea, bronchi, lung and pleura) systems. Study of etiology, pathology and pathogenesis of specific infectious and non-infectious diseases of domestic animals related to the above mentioned systems

<u>UNIT II</u>

Advanced study of pathological conditions affecting different organs of digestive (buccal cavity, pharynx, oesophagus, stomach and intestines)

urinary (kidneys, ureter, urinary bladder and urethra) and genital (male and female organs including mammary gland) systems. Study of etiology, pathology and pathogenesis of specific infectious and non-infectious diseases of domestic animals related to the above mentioned systems.

UNIT III

Advanced study of pathological conditions affecting different organs of nervous (brain and spinal cord), endocrine (pituitary, thyroid, parathyroid, pancreas), musculo-skeletal systems (muscles and bones), and organs of special senses (eye, ear), skin and its appendages (hoof, tail). Study of etiology, pathology and pathogenesis of specific infectious and non-infectious diseases of domestic animals related to the above mentioned systems/organs.

Practical

To study the gross and histopathological changes in important conditions affecting various systems. Study of gross and microscopic lesions in specific diseases pertaining to above said systems.

Suggested Readings

Jubb KVF & Kennedy PC. 2005. Pathology of Domestic Animals. Academic Press.

VPP 608 PATHOLOGY OF INFECTIOUS DISEASES OF 2+1 DOMESTIC ANIMALS

Objective

To teach the students about the important infectious disease conditions of domestic animals

Theory

UNIT I

Pathology of various viral diseases of domestic animals.

UNIT II

Pathology of various bacterial and fungal diseases of domestic animals.

UNIT III

Pathology of various rickettsial and parasitic diseases of domestic animals.

Practical

To study the slides, museum specimens including autopsy specimens concerned with specific diseases.

Suggested Readings

Jones TC, Hunt RD & King NW 1997. *Veterinary Pathology*. Blackwell Publishing.

Jubb KVF & Kennedy PC 2005. *Pathology of Domestic Animals*. Academic Press.

VPP 609 TOXICOPATHOLOGY 2+1

Objective

To teach students about toxicity in livestock due to plants and extraneous poisons.

Theory

UNIT I

Introduction, mode of action, diagnosis and treatment of different poisons and their classification.

UNIT II

Pathogenesis, gross and microscopic pathology of diseases caused by toxic plants, organic and inorganic poisons commonly taken or administered maliciously to different species of domestic animals.

Practical

To study gross and histopathological alterations as a result of ingestion of toxic plants and extraneous poisons in domestic animals.

Suggested Readings

Jones TC, Hunt RD & King NW 1997. *Veterinary Pathology*. Blackwell Publishing.

VPP 610 AVIAN PATHOLOGY

2+1

Objective

To teach the students about the different disease conditions of poultry including pathology and diagnosis.

Theory

UNIT I

Pathology of infectious diseases of chickens, turkeys, ducks and other birds. UNIT II

Pathology of non-infectious diseases of chickens, turkeys, ducks and other birds.

Practical

Necropsy examination of the different species of poultry; study of gross and histopathological lesions in naturally occurring and artificially produced diseases of birds.

Suggested Readings

Calnek BW. 1991. *Diseases of Poultry*. 9th Ed. Iowa State Univ. Press. Saif YM, Barnes FJ, Glisson JR, Fadly AM, Mc Dougald LR & Swayne D. 2008. *Diseases of Poultry*. 11th Ed. Blackwell Publishing.

VPP 611 PATHOLOGY OF LABORATORY ANIMALS, 2+1 FISH AND WILD ANIMALS

Objective

To teach the pathology and diagnosis of different disease conditions of laboratory animals, fish and wild animals.

Theory

UNIT I

Introduction, disease transmission and inter-phase.

UNIT II

Pathology of important infectious diseases (viz. bacterial, viral, fungal and parasitic) of fish, laboratory and wild/zoo animals.

UNIT III

Pathology of non-infectious diseases of fish, lab/ wild/zoo animals.

Practical

Post-mortem examination of wild animals including wild birds. Study of gross and microscopic lesions of important infectious and non - infectious diseases of fish and laboratory animals.

Suggested Readings

Arora BM. 1984. Wildlife Diseases in India. Periodical Expert Book Agency.

Fowler ME. 1978. Zoo and Wild Animal Medicine. WB Saunders.

Beninchka K, Garner FM & Jones TC. 1978. *Pathology of Laboratory Animals* (Vols. I, II). Springer Verlag.

Roberts RJ. 1979. Fish Pathology. Bailliere Tindall, London.

VPP 612 VETEROLEGAL PATHOLOGY

1+0

Objective

To educate the students about common veterolegal problems and legal writing of PM report.

Theory

UNIT1

General knowledge about the laws relating to veterinary practice, professional discipline and professional etiquettes.

UNIT II

Regulations dealing with diseases of animals in India regarding epidemiology, quarantine certificate, issue of soundness certificate etc.

UNIT III

Common causes of violent death, criminal assault, cruelty to animals, malicious poisoning, snake bite, electrocution, gun shot wounds, automobile accidents, doping etc.

Suggested Readings

Gahlot AK, Sharma SN & Tanwar RA. 2003. *Veterinary Jurisprudence*. 5th Ed. NBS Publishers, Bikaner.

Jones TC & Gleiser CA. 1954. Veterinary Necropsy Procedures. JB Lippincott.

Lincoln PJ & Thomson J. 1998. Forensic DNA Profiling Protocols. Humana Press.

Rudin N & Inman K. 2002. An Introduction to Forensic DNA Analysis. CRC Press.

VPP 701 PATHOLOGY OF NUTRITIONAL AND 2+1 METABOLIC DISTURBANCES

Objective

To teach students about nutritional and metabolic disorders of livestock.

Theory

UNIT I

Pathogenesis, gross and microscopic pathology of nutritional deficiencies viz. carbohydrate, protein, fats, vitamins and macro and microelements and their imbalances.

UNIT II

Different metabolic diseases namely milk fever, ketosis, tetany, azoturia. Downer's cow syndrome and post parturient hemoglobinuria in domestic animals.

Practical

Estimation of certain minerals in sera of natural and experimentally induced deficiencies in domestic animals. To study the haematological, gross and microscopic pathological alterations caused by nutritional and metabolic disorders.

Suggested Readings

Selected articles from journals.

VPP 702 ADVANCES IN TOXICOPATHOLOGY

2+1

Objective

To teach students about toxicity in livestock due to plants and extraneous poisons.

Theory

UNIT I

Introduction, mode of action, diagnosis and treatment of different poisons and their classification. Experimental animal models for toxicity studies and evaluation of parameters.

UNIT II

Pathogenesis, gross and microscopic pathology of diseases caused by toxic plants, organic and inorganic poisons commonly taken or administered maliciously to different species of domestic animals.

Practical

Clinico-pathological studies on natural or experimentally induced toxicity /poisoning in domestic animals. To study gross and histopathological alterations as a result of ingestion of toxic plants and extraneous poisons in domestic animals.

Suggested Readings

Selected articles from journals.

VPP 703 ADVANCES IN DIAGNOSTIC PATHOLOGY 1+2

Objective

To teach current diagnostic techniques for diagnosis of different diseases.

Theory

UNIT I

Study of the principles of biopsy techniques and electron microscopy.

UNIT II

Current techniques for diagnosis of diseases.

Practical

Principles and practice of fluorescent and phase contrast microscopy, chromatography, spectrophotometery and immunodiffusion technique, use of laboratory animals, chick embryos etc. for the diagnosis of animal diseases.

Suggested Readings

Selected articles from journals.

VPP 704 ULTRASTRUCTURAL PATHOLOGY 1+1

Objective

To study the significance of ultra-structural changes in organelles.

Theory

UNIT I

Study of cells- cell morphology, interpretation of normal and abnormal cells.

UNIT II

Study of cell organelles, degenerations, infiltrations, viral inclusions.

Practical

Study of EM photographs, collection and preparation of specimens for EM studies.

Suggested Readings

Selected articles from journals.

VPP 705 IMMUNOPATHOLOGY 2+1

Objective

To teach students immunologically mediated and autoimmune diseases of livestock.

Theory

UNIT I

Principles of immunopathology, hypersensitivity status, pathology of immune complex diseases.

UNIT II

Immunoproliferative disorders, autoimmune diseases and immune deficiencies in man and domestic animals.

Practical

Immune complexes, quantification and determination by various techniques, enumeration of various populations of lymphocytes by different techniques, determination of C3 levels, autoimmune reaction by demonstrating autoantibodies, hypersensitivity reactions (class IV and others).

Suggested Readings

Selected articles from journals.

VPP 706 PATHOLOGY OF IMPORTANT AND EMERGING 1+1 DISEASES OF PETS AND LIVESTOCK

Objective

To teach students important and emerging diseases of pets and livestock.

Theory

<u>UNIT I</u>

Introduction to emerging diseases, foot and mouth disease, vesicular stomatitis, vesicular exanthema, rinderpest/Peste des petits ruminants, para influenza -3, infectious bovine rhinotracheitis/infectious pustular vulvovaginitis, bovine spongiform encephalopathy, scrapie, blue tongue, malignant catarrhal fever, mucosal disease/bovine viral diarrhoea, bovine leucosis.

UNIT II

Tuberculosis/Johne's disease, brucellosis, listeriosis, caprine arthritis, campytobacteriosis, encephalitis, parvovirus infection, emerging diseases of pets.

Practical

Study of clinical and gross alterations and histopathology of some important emerging and enzootic diseases.

Suggested Readings

Selected articles from journals.

VPP 707 ADVANCES IN AVIAN PATHOLOGY 2+1

Objective

To teach different diagnostic techniques for diagnosis of different avian diseases.

Theory

UNIT I

Advances in pathogenesis and pathology including molecular basis of important infections (bacterial, viral, fungal and parasitic).

UNIT II

Non-infectious diseases with particular emphasis on emerging diseases of chickens, turkeys, ducks and other birds.

Practical

Necropsy examination of different species of poultry. Study of gross and microscopic lesions in natural and experimentally produced diseases in different species of birds. Diagnosis of different diseases of poultry.

Suggested Readings

Selected articles from journals.

VPP 708 PATHOLOGY OF FUNGAL DISEASES 2+1

Objective

To teach the diseases caused by different fungi and mycotoxins in animals.

Theory

UNIT I

Pathology of diseases associated with pathogenic fungi like aspergillosis, candidiasis, epizootic lymphangitis, histoplasmosis, coccidioidomycosis, cryptococcosis, bovine abortions, dermatophytomycosis etc.

UNIT II

Diseases associated with mycotoxins like aflatoxins, rubratoxin, T₂ toxin, ochratoxin etc. Metabolism of toxins and their effect in man, domestic and laboratory animals, poultry and aquatic species.

Practical

Demonstration of pathogenic mycotoxic fungi, chemistry of toxic compounds, physical and chemical properties, methods of extraction, isolation and identification of mycotoxins.

Suggested Readings

Selected articles from journals.

VPP 709 MOLECULAR PATHOLOGY OF CELL INJURY 2+1

Objective

To acquaint the students about the molecular basis of cell injury and inflammation.

Theory

UNIT I

Causes of cell injury - Ischemic, Hypoxic, Free radicals, virus and chemical cell injury - Chemical Mediators - Cytoskeletal and biochemical changes in cell injury.

UNIT II

Ultrastructural changes and biochemical mechanisms of reversible injury, necrosis, apoptosis. Molecular basis of disease. Cellular adaptation-hyperplasia, hypertrophy, atrophy, metaplasia and dysplasia. Intracellular accumulations.

UNIT III

Inflammation- mechanism and types. Tissue repair and healing.

Practical

Gross and histopathological studies pertaining to above conditions.

Suggested Readings

Selected articles from journals.

VPP 710 EXPERIMENTAL PATHOLOGY 1+1

Objective

To provide expertise in designing the experiments and handling of animals.

Theory

UNIT I

Need for experimentation in research, animal experimentation techniques, preparation of experimental protocols, biochemical studies, pathological examination of clinical samples.

UNIT II

Transplantation techniques, immune regulation, tissue culture, blood cell separation protocols, electrophoresis and chromatography, study of animal model and designing of experiment.

Practical

Short research problems involving contemporary issues and research techniques.

Suggested Readings

Selected articles from journals.

VPP 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.