

SEMESTER- III

COURSE NO.	COURSE TITLE	CREDIT HOURS
VAN-211	Veterinary Histology & Embryology	2+2=4
VPA-211	General Veterinary Parasitology & Helminthology	3+1 =4
VPP-211	General Veterinary Pathology	1+1=2
VMC-211	General Veterinary Microbiology	1+1=2
LPM-211	Avian Production Management	1+1=2
ANN-211	Applied Animal Nutrition-II (Non-ruminants, Poultry & Laboratory Animals)	2+1=3
AGB-211	Livestock and Poultry Breeding	2+1=3
LFP-211	Livestock Farm Practice (Non-Credit)	0+1=1
Total Credits		12+9=21

VAN -211 : VETERINARY HISTOLOGY AND EMBRYOLOGY

Credit Hours 2+2=4

THEORY

General Histology: Structure of animal cell and basic tissues and their functional activity. Epithelia and their modifications. Connective tissue and its components including blood and bone. Muscular tissue types and their functional peculiarities. Neuron, nerve fibre and ganglion.

Systemic Histology: Study of microscopic structure of the organs of digestive, respiratory, urinary, reproductive, nervous and cardiovascular systems, sense organs, endocrines and lymphoid organs, of domestic animals and birds.

Embryology: Gametogenesis, fertilization, cleavage, gastrulation, and the development of foetal membranes in birds and mammals. Structure and types of mammalian placenta. Development of the organs of digestive, respiratory, urogenital, cardiovascular, nervous and locomotor system and organs of special sense and endocrine glands. Fetal circulation.

PRACTICAL

Microscopy and micrometry. Comparison of light and electron microscopy. Histological techniques, Processing of tissues for paraffin sectioning and Haematoxylin and Eosin staining. Microscopic examination and identification of basic tissue and their components. Examination of histological sections of various organs/systems of domestic animals and birds. Study of structure of mammalian ova and spermatozoa and egg of fowl. Study of the whole mount and serial sections of avian and mammalian embryo / foetus at different stages of development Microscopic anatomy of fetal membranes and placenta of various domestic animals.

VPA- 211: GENERAL VETERINARY PARASITOLOGY AND HELMINTHOLOGY

Credit Hours 3+1=4

THEORY

Parasites and parasitism. Types of Parasitism. Commensalism, symbiosis and predatorism, Types of hosts: Final and Intermediate hosts, paratenic hosts and reservoir hosts, natural and unnatural hosts. Host- parasite relationship; mode of transmission of parasites and methods of dissemination of the infective stages of the parasite. Parasite specificity in relation to species, breed, sex and location. Tissue reactions caused by parasites to the host. Resistance of hosts to parasitic infections/infestations. Immunity against parasitic infections. Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD). General description of helminth parasites affecting domestic animals and birds.

Classification of helminths. Characteristics of phylum (Platyhelminthes, Nematelminthes and Acanthocephala). Salient morphological features of diagnostic importance. Life cycle of the helminths in relation to transmission, pathogenesis, epidemiology, diagnosis, general control measures of following helminthes of animals and birds.

Trematodes: Liver flukes (*Fasciola*, *Dicrocoelium* and *Opisthorchis*), intestinal flukes (*Fasciolopsis*), blood flukes (nasal schistosomosis), cercarial dermatitis (*Schistosoma* and *Ornithobilharzia*), visceral schistosomosis (*S. spindale*, *S. indica*, *S. incognitum*), Amphistomes/immature amphistomosis (*Paramphistomum*, *Cotylophoron*, *Gastrothylax*, *Gastrodiscus*,

Gigantocotyle, *Gastrodiscoides*, *Pseudodiscus*), Lung Hukes(*Paragonimus*) and oviduct flukes (*Prosthogonimus*), their importance in the diagnosis.

Cestodes: Metacestodes (bladder worm), Ruminant tape worms (*Moniezia*, *Avitellina*, *Stilesia*), Dog tape worms (*Dipylidium*, *Taenia*, *Multiceps* and *Echinococcus*), Equine tape worms (*Anoplocephala*, *Paranoplocephala*), Poultry tape worms (*Davainea*, *Cotugnia*, *Raillietina*, *Amoebotaenia*) and Broad fish tape worm (*Diphyllobothrium*), Dwarf tape worm (*Hymenolepis*).

Nematodes: *Ascaris*, *Parascaris*, *Toxocara*, *Toxascaris*, *Ascaridia*, *Heterakis* and *Oxyuris*. Bursate Worms (*Strongyloides*, *Strongyles*, *Chabertia*, *Syngamus*, *Oesophagostomum*), Kidney worms (*Stephanurus*, *Dioctophyma*), Hook worms (*Ancylostoma*, *Agriostomum*, *Bunostomum*, *Trichostrongylus*, *Ostertagia*, *Cooperia*, *Nematodirus*). Stomach worms (*Haemonchus*, *Mecistocirrus*). Tissue round worms (*Habronema*, *Thelazia*, *Spirocerca*, *Gongylonema*). Filarial worm *Dirofilaria*, *Parafilaria*, *Onchocerca*, *Setaria*, *Stephanofilaria*). Lung worms (*Dictyocaulus*, *Mullerius* and *Protostrongylus*). Guinea worms (*Dracunculus*). International regulations for control of different helminthic diseases.

PRACTICAL

Methods of collection, fixation, preservation and mounting of helminth parasites. Study of morphological characters of adults and their larval stages and damages caused by them. Identification of important trematodes, cestodes and nematodes. Examination of faecal samples for eggs of trematodes, cestodes and nematodes. Demonstration of the life cycle and development of the type species of Trematode, Cestode and Nematode.

REFERENCE BOOKS

1. Helminths, Arthropods and Protozoa of Domesticated Animals - E.J.L. Soulsby.
2. Veterinary Parasitology - G.M. Urquhart *et. al.*
3. Introduction to Animal Parasitology - J.D. Smyth.
4. A Text Book of Veterinary Parasitology - B.B. Bhatia, K.M.L. Pathak. & D.P. Banerjee
5. Veterinary Helminthology - T. Kassai
6. General Veterinary Parasitology - P.C. Jain
7. Manual of General Veterinary Parasitology - S.S. Chaudhari & S.K. Gupta
8. Manual of Veterinary Helminthology - S.S. Chaudhari, *et. al.*
9. Introduction to Animal Parasitology - J.D. Smyth

VPP-211 GENERAL VETERINARY PATHOLOGY**Credit Hours 1+1=2****THEORY**

Introduction and scope of Veterinary Pathology, Brief outline of major intrinsic and extrinsic causes of disease. Pathology of hyperaemia, congestion, haemorrhage, edema, thrombosis, embolism, infarction and shock.

Acute cellular swelling and its variants. Glycogen overload and fatty change. Heat shock proteins and lysosomal storage diseases.

Causes and mechanism of reversible and irreversible cell injury, necrosis and its types, apoptosis, differences between post-mortem autolysis and necrosis. Gangrene. Major exogenous and endogenous pigments. Metastatic and dystrophic calcification.

Jaundice in animals. Photosensitization dermatitis. Aplasia, hypoplasia, atrophy, hypertrophy, hyperplasia, metaplasia and dysplasia. Inflammation: definitions, classification, various cell types and their functions, mediators, cardinal signs and systemic effects.

Cell cycle and cyclins, soluble and insoluble mediators (including growth factors).

Wound healing by primary and secondary intention. Pathology of autoimmune diseases and amyloidosis.

Definitions, general characteristics and classification of neoplasms. Differences between benign and malignant tumours, etiology and spread of neoplasms, immunity and neoplasia, effects and diagnosis of neoplasia, stages and grades of neoplasms.

PRACTICAL

Study of gross pathological specimens and recognition of pathological lesions. Post-mortem (P.M.) techniques. Collection of morbid materials for pathological diagnosis. Techniques for preservation and despatch of materials. Section cutting, staining and identification of microscopic lesions. Examination of slides depicting changes in cells and tissues. Study of histopathological slides showing haemorrhage, congestion, oedema, infarction, hyperplasia, metaplasia, hypertrophy, necrosis, cloudy swelling, amyloid degeneration, fatty changes, calcification . infiltration etc. Examination and interpretation of oncological tissue slides.

VMC-211: GENERAL VETERINARY MICROBIOLOGY**Credit Hours 1+1=2****THEORY**

Introduction and history of Microbiology. Morphology, structure, growth and nutrition of bacteria. Classification and nomenclature of bacteria. Sources and transmission of infection. Pathogenicity, virulence and infection. Resistance and susceptibility of host bacteriaemia, septicaemia, toxemia. endotoxins and exotoxins; Bacterial genetics. Plasmids, Antibiotic resistance.

Introduction, morphology, growth, nutrition, reproduction in fungi, Classification of fungi. Introduction to viruses: General properties, Replication, Cultivation and Purification of viruses. Cell-Virus interactions. Viral genetics. Interferon,

PRACTICAL

Equipment, Sterilization, disinfection and asepsis, Staining (simple & Grams, acid fast, lactophenol cotton blue), Special staining (metachromatic granules, capsular, spore). Bacterial motility, Preparation of culture media. Aerobic and anaerobic cultivation, Isolation of bacteria in pure culture, Morphological and cultural characteristics, biochemical characters, Antibigram, Phenol coefficient test, Slide culture technique for fungus.

REFERENCE BOOKS

1. Microbiology - 4th ed. Prescott, Herley and Klein
2. Practical Medical Microbiology - Collee, Dugid, Frazer and Marnion
3. Veterinary Virology - Murphy, Gibbs, Horzineck and Studert

LPM- 211: AVIAN PRODUCTION MANAGEMENT**Credit hours 1+1=2****THEORY**

Indian Poultry industry-brief outline of the different segments-poultry statistics. Classification of poultry, common breeds of poultry including duck, quail, turkey & guinea fowl and their descriptions. Description of indigenous fowls.

Reproduction in fowl, male and female reproduction systems, formation of eggs, structure of eggs. Important economic traits of poultry, egg production, egg weight egg quality, growth, feed consumption and feed efficiency, fertility and hatchability, plumage characteristics and comb types. Scavenging system of management raising of chicks, scavenger feed base of village. Low input technology; backyard and semi intensive unit of various sizes; their description, management and economic achievements.

New colored feathered birds developed in public and private sectors for meat and egg production for rural poultry; their acceptability and assimilation in rural ecosystem. Mixed farming and poultry raising. Concept of self-local market unit Brooding and rearing practices used for chicken, duck, quail, turkey and guinea fowl. Economic production of chicken and other classes of poultry.

Hatching and feeding norms for different species of poultry. Marketing of poultry and poultry products. Setting of farms for different classes of poultry. Organic and hill farming.

PRACTICAL

Morphological description of common exotic poultry breeds like White Leghorn (WLH), Rhode Island Red (RIR), Plymouth Rock, Cornish and New Hampshire. Diagrammatic illustration of body parts of chicken, duck, quail, guinea fowl and turkey. Descriptive specialties of indigenous birds, listing of its advantageous value in rural areas. Diagrammatic representation of scavenging, backyard and semi intensive units; with habitats, feed base and shelter. Conservation of indigenous germ plasm; listing of conservation techniques. Demonstration of newly developed breeds in rural environment Housing, equipments, nesting and brooding requirements. Vaccination, medication and incubation requirements. Preparation of projects for rural people on poultry and other species (duck, quail, guinea fowl and turkey).

ANN- 211: APPLIED NUTRITION-II (NON-RUMINANTS, POULTRY AND LABORATORY ANIMALS)**Credit Horns: 2+1=3****THEORY**

Factors affecting digestibility of a feed. Nutrient requirements in poultry, swine and equine -Energy and protein requirement for maintenance and production. Methods adopted for arriving at energy and protein requirements for maintenance and production in terms of growth, reproduction and production (egg, meat and work). Formulation of rations as per Bureau of Indian Standards (BIS), National Research Council

(NRC) and Agricultural Research Council (ARC) specifications. Feeding standards, their uses and significance, merit and demerits of various feeding standards with reference to monogastric animals and poultry. Feeding of swine (Piglets, Growers, Lactating and pregnant sows, Breeding boar, Fattening animals), equine (foal, yearling, broodmare, stallion and race horses) and poultry (Starter, Growers, Broilers, Layers) with conventional and unconventional feed ingredients. Feeding of ducks. Laboratory Animal Nutrition: Nutrient requirements of mice, rat, rabbit and guinea pig. Significance of carbohydrates, lipids, proteins and amino acids, minerals and vitamins in lab animal nutrition. Diet formulation and preparation and feeding practices. Feed supplements.

PRACTICAL

Calculation of requirements of nutrients in terms of DCP, TDN and ME for maintenance, growth, reproduction and other types of production like egg and meat. Formulation of rations for poultry and swine with conventional and unconventional feed ingredients. Principles of compounding and mixing of feeds. Visit to poultry farms.

REFERENCE BOOKS

1. Principles of Animal Nutrition and Feed Technology - by D.V. Reddy.
2. Animal Nutrition (Livestock, Poultry, Pet, Rabbit and Laboratory Animal Nutrition) - by D.V. Reddy.
3. Feeds and Principles of Animal Nutrition - by G.C. Banejee

AGB-211: LIVESTOCK AND POULTRY BREEDING

THEORY

History of Animal Breeding; Classification of breeds; Economic characters of livestock and poultry and their importance; Breeding/Selection techniques for optimal production. Selection: Response to selection and factors affecting it; Bases of selection individual, pedigree, family, sib, progeny and combined; Indirect selection; Multitrait selection. Classification of mating systems; Inbreeding and out breeding-genetic and phenotypic consequences viz., inbreeding depression and heterosis: Systems of utilization of heterosis; Selection for combining ability; Breeding methods for the improvement of dairy cattle and buffaloes {crossbreeding, sire evaluation, field progeny testing, open nucleus breeding system (ONBS)}, sheep, goat, swine and poultry; Breed development; Conservation of germplasm, Current livestock and poultry breeding programmes in the state and country.

PRACTICAL

Description and measurement of economic traits of Livestock & poultry. Standardization of performance records, Computation of selection differential, generation interval and expected genetic gain; Construction of selection index; Sire indices. Measurement of inbreeding and relationship coefficients; Estimation of heterosis.

REFERENCE BOOKS

1. "Introduction to Quantitative Genetics" by D.S. Falconer
2. "Dairy Bovine Production" by C.K. Thomas and N.S.R. Sastry
3. Handbook of Animal Husbandry Sciences by Amalendu Chakraborti
4. Genetics and Breeding of Farm Animals by D. P. Mukherjee and G.C. Banergee
5. Understanding Animal Breeding by Richard M. Bourdon
6. Animal Breeding by Gerald Weiner
7. Veterinary Genetics by F.W. Nicholas
8. Handbook of Animal Husbandry 0 ICAR publication
9. Principles and Practice of Poultry Husbandry by Tom Newman
10. Textbook of Animal Breeding by S.S. Tomar
11. Dalton's Introduction to Practical Animal Breeding by Malcolm B. Willis
12. Genetics of Livestock Improvement by John F. Lasley
13. Breeding and improvement of farm animal by Warwick, E.J. and Legates, J.E.

LFP- 211: LIVESTOCK FARM PRACTICE (NON-CREDIT)

0+1=1 Credits

Hands on training of the students on the overall farm practices of livestock management including cleaning, feeding, watering, grooming, milking, routine health care, record keeping, sanitation, housing, fodder production.

These courses shall be non-credit courses and the performance of students shall be assessed and recorded as grades: A- Excellent, B- Good, C- Average and recorded on the Degree Transcript.