Course Curriculum and Syllabus

For the Degree of

BACHELOR OF VETERINARY SCIENCE AND ANIMAL HUSBANDRY
(B.V.Sc. & A.H.)

College of Veterinary & Animal Sciences
G.B. Pant University of Agriculture and Technology
Pantnagar – 263 145, Distt. Udham Singh Nagar
Uttarakhand (India)
SYLLABUS AND LECTURE OUTLINES OF COURSES

DEPARTMENT OF VETERINARY ANATOMY

SEMESTER I

Course Title : Veterinary Gross Anatomy –I
(Osteology, Arthrology, and Biomechanics)
Course No. : VAN-111
Credit Hours : 1+ 2 =3

I. SYLLABUS

THEORY

Osteology : Definition of the terms used in Veterinary Anatomy in general and osteology in particular. Classification physical properties and structure of bones, Gross study of bones of appendicular and axial skeleton of Ox/Buffalo as type species and comparison with Sheep/Goat, Pig, Horse, Dog and Fowl with particular emphasis on their topography contours, landmarks, functional anatomy from clinical and production point of view. Detail study of bones of head, neck, thorax, abdomen, pelvis, tail, forelimb and hindlimb.

Arthrology : Classification and structure of joints Articulation and ligaments of head, neck, thorax abdomen, pelvis, tail, forelimb and hind limb of ox/buffalo as type species, their structure functional anatomy and comparison with other domestic animal from clinical and production point of view.

Biomechanics : Biomechanics and its application with reference to quadruped locomotion, kinetics of locomotion stress and strains falling on locomotor apparatus, landmarks, angulations and weight bearing bones of ox, buffalo and comparison with other animals particularly horse and dog.

PRACTICAL

Comparative study of the bones of appendicular and axial skeleton, their structure, landmarks angulation, weight bearing and function in Ox/buffalo and comparison with sheep/goat, pig, horse dog and fowl and relate them in live animals. Dissection of joints of all the regions of Ox/Buffalo to study the structure and functional and comparison with other domestic animals. Biomechanics and kinetics of locomotion.

SEMESTER II

Course Title : Veterinary Gross Anatomy- II
(Myology, Neurology, Angiology and Aesthesiology)
Course No : VAN-121
Credit Hours : 2+2=4

I. SYLLABUS

THEORY

Myology: Structural and functional classification of muscles. Gross Study of skeletal muscles of head, neck, thorax abdomen, pelvis, tail, forelimb and hindlimb with their origin, insertion and action and their structural and functional importance from clinical and production point of view in Ox/Buffalo as a type species. Comparative study of muscles in other domestic animals.

Neurology: Study of central, peripheral and autonomic nervous system. Gross study of meninges, brain, spinal cord, cranial and spinal nerves and their functional importance from clinical and production point
of view. Gross morphology and disposition of the nerves of head, neck, thorax, abdomen, pelvis, tails, forelimb and hindlimb in Ox/Buffalo as a type and comparative study in other domestic animals.

**Angiology:** Gross morphology of heat and disposition of arteries, veins and lymphatic of head, neck thorax, abdomen, pelvis, tail, forelimb and hindlimb in Ox/Buffalo as type and comparison with that of Sheep/Goat, Pig, Horse, Dog and Fowl. Their importance from clinical and production point of view. Aesthesiology Gross morphological study of the eye, ear, nose, hoof, horn and skin in Ox/ Buffalo. Their functional importance and comparative study in other domestic animals. Computer simulation for dissection and study of body parts.

*(Note: The general outline of muscular, circulatory and nervous system be taken up in The beginning of this course to be followed by gross disposition of group of muscles, arteries, veins and lymphatic simultaneously region-wise.)*

**PRACTICAL**

Demonstration of embalming of the carcass and preservation. Dissection/Computer simulation models for dissection and demonstration of body parts.

Dissection of muscles of all body regions of Ox/Buffalo, their location, functional role in the body and comparison with other species.

Study of brain and spinal cord in different domestic animals. Study of heart and major blood vessels in different species of animals. Area of auscultation of heart.

Dissection of blood vessels, lymphatics and nerves of head, neck thorax, abdomen, pelvis, tail forelimb and hindlimb in Ox/Buffalo and comparative study in other domestic animals. Demonstration of palpable Lymph nodes of the body. Study of the sites of cornal, auriculo palpebral, peterson’s, infraorbital, radial, ulnar, median, paravertebral epidural, pudendal, perineal and tibial nerve blocks and their clinical importance.

Dissection for study of eye, ear, nose, hoof and horn.

**SEMESTER III**

**Course Title**: Veterinary Histology and Embryology

**Course No.**: VAN-211

**Credit Hours**: 2+2=4

**I. SYLLABUS**

**THEORY**


**Embryology:** Gametogenesis, fertilization, cleavage, gastrulation, and the development of foetal membranes in birds and mammals. Structure and type 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 tissues 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 section of avian and mammalian embryo/foetus at different stages of development. Microscopic anatomy of fetal membranes and placenta of various domestic animals.

SEMESTER IV

Course Title : Veterinary Spanchnology And Applied Anatomy
Course No. : VAN-221
Credit Hours : 1+1 = 2

I. SYLLABUS

THEORY

Gross morphological and topographical study of various organs of digestive, respiratory, urinary, male and female reproductive, lymphatic and endocrine systems. Pleura and Peritoneum in Ox Buffalo as type species and their comparison with that of Sheep/Goat, Pig, Horse, Dog, and Fowl.

Different Terminology used in applied Anatomy. Palpable Anatomical body structures and their use in Health and disease.

PRACTICAL


Applied anatomy of sites for thoraco-centesis, auscultation, abdominocentesis, rumenotomy, laparotomy, spleenectomy, enterotomy, palpation of anatomical structures in the abdominal and perineal regions. Radiographic visualization of gross anatomical features of various regions of the body.

(Note: Computer simulation model studies shall be used for better understanding of the subject.)
**DEPARTMENT OF VETERINARY PHYSIOLOGY AND BIOCHEMISTRY**

**SEMMESTER I**

<table>
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<tr>
<th>Course Title</th>
<th>Veterinary Physiology-I (Blood, Cardiovascular, Excretory System and Body Fluids)</th>
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**I. SYLLABUS**

**THEORY**

Introduction to Blood; Properties of blood as a body fluid, metabolism and fate of R.B.C; Hemoglobin-chemical structure, synthesis, physiological functions, derivatives of hemoglobin;

Heart-morphological characteristic, systemic excitability conduction & transmission processes. Cardiac Cycle: - Regulation of cardiac output; coronary circulation; properties of pulse; metabolism & energetic of working myocardial cell, extrinsic and intrinsic regulation; ECG and its significance in Veterinary Sciences - Echocardiography.


Adjustment of circulation during exercise.

Kidney- Functional morphology of nephrons, factors determining filtration pressure, determination of glomerular filtration rate (GFR) and renal plasma flow - Reabsorption mechanisms for glucose, protein, amino acids, electrolytes; ammonium mechanism, glomerulo-tubular balance, methods of studying renal functions; urine concentration; micturition, uremia.

Fluid, water balance, fluid therapy, dehydration, water concentration mechanisms. Acid base balance and H+ regulation, correction and evolution of imbalances, total osmotic pressure, potassium Formation and excretion of urine of Birds.

Cerebrospinal fluid, synovial fluids - composition, formation and flow; Joints. Regulation of bone metabolism and homeostasis.

**PRACTICAL**

SEMESTER II

Course Title : Veterinary Physiology-II
              (Neuromuscular, Digestive & Respiratory System)

Course No : VPB -121
Credit Hours : 2+1=3

I. SYLLABUS

THEORY

Muscle Physiology- basic muscle unit characteristic-electrical phenomenon in muscle cell - Membrane potential ionic basis of resting membrane potential, muscle action potential, excitation and propagation of impulse characteristics- latent period refractive ness, threshold level-all & none characteristics - contractile mechanism - excitation - contraction coupling - neuro-muscular transmission, types of muscle contraction, phenomenon of fatigue, rigor mortis.

Organization of nervous system- Mechanism of information processing, hierarchical control. Major function system- sensory, consciousness, emotion, motor and visceral control and basic functional unit - neuron structure, type- functional characteristics of sub-units of neuron. Membrane potential - ionic basis of resting membrane potential (RMP) nerve action potential, excitation and propagation of impulse characteristics- latent period- refractive ness, threshold level-all & none characteristics. Degeneration and regeneration of nerve fibre. Synaptic and junctional transmission.

Functions of nervous system-reflexes-control of posture and movements, autonomic nervous system and visceral control. Neurotransmitter wakefulness, sleep cycle. Higher function of neurons system - learning, memory. Familiarization with common equipments used in neurophysiology (oscilloscope, electroencephalography, machine stimulators etc).


Morphological characteristic of monogastric and poly gastric digestive system. Prehension, rumination; defecation; vomition; regulation of secretory function of saliva, stomach, intestine, pancreas; bile secretion; hunger, appetite control, developmental aspects of digestion; luminous, membranous and microbial digestion in rumen and intestine; permeability characteristics of intestine, forces governing absorption, control intestinal transport of electrolyte and water, enzymatic digestion in monogastric and fermentative digestion in rumen, modification of toxic substances in rumen. Digestion in birds.


PRACTICAL

SEMESTER IV

Course Title : Veterinary Physiology – III (Endocrinology, Reproduction, Growth and Environmental Physiology)
Course No : VPB-221
Credit Hours : 3+1=4

I. SYLLABUS

THEORY

Hormone cell interaction, sub-cellular mechanisms-metabolism of hormones-methods of study of endocrine system; Receptors- mechanism of regulation; Chemistry of hypothalamo- hypophyseal hormones, target organ, pinesal, thyroid, thymus, pancreas, adrenal, proctaglandins, hormones of calcium metabolism, disorders, rennin-angiotensin system, atrial natriuretic factors, erythropoietin, GI hormones, pheromones.

Genetic & endocrine control of gonadal development, modification of gonadotrophin release, ovarian functions, follicular development, dynamics, endocrine and receptor profiles, sexual receptivity, ovarian cycle, post partum ovarian activity, ovum transport, capacitation, fertlization, reproductive cycles in farm animals- hormones present in the biological fluids during pregnancy and their uses for the diagnosis of pregnancy- maternal foetal placental participation in pregnancy & parturition, immunology of gestation, preparturient endocrine


Functional and metabolic organization of mammary glands - structure and development; effect of estrogens and progesterone; hormonal control of mammary growth; lactogenesis and galctogenesis; biosynthesis of milk constituents- secretion of milk, mastitis and metabolism, prolactin and mammary tumours-lactation cycle.

Biochemical and genetic determinants of growth, regulation of growth, metabolic and hormone interactions, factors affecting efficiency of growth and production in ruminants and single stomach animals. Growth in meat producing animals & birds, growth curves. Recombinant gene transfer technologies for growth manipulation- advantages and limitations. Protein deposition in animals and poultry.

Heat balance, heat tolerance, hypothermia, hyperthermia, thermo-regulation in farm animals, role of skin, responses of animals to heat and cold, fever, body temperature and hibernation. Temperature regulation in birds.

Climatology- various parameters and their importance. Effect of different environmental variables like temperature, humidity, light, radiation, altitude on animal performance. Acclimation, acclimatization - general adaptive syndrome. Clinical effect on endocrine - reproductive function, circadian rhythm.

Neurophysiology of behaviors, types of behaviour, communication, Learning and memory behavioural plasticity.

PRACTICAL

SEMESTER I

Course Title : General Veterinary Biochemistry
Course No. : VPB-112
Credit Hours : 1+1= 2

I. SYLLABUS

THEORY


Biochemistry of carbohydrates. Biological significance of important Monosaccharides (ribose, glucose, fructose, galactose, mannose and amino sugars), Disaccharides (maltose, isomaltose, lactose, sucrose & cellobiose), Polysaccharides, (starch, dextrans, dextrins, glycogen, cellulose, inulin, chitin), and Mucopolysaccharides including bacterial cell wall polysaccharides.


Biochemistry of nucleic acids: Chemistry of purines, pyrimidines, nucleosides and nucleotides. Biological significance of nucleosides & nucleotides. Structures and functions of deoxyribonucleic acid (DNA) and a typical ribonucleic acid (RNA).

PRACTICAL


SEMESTER II

Course Title : Veterinary Intermediary Metabolism
Course No. : VPB-122
Credit Hours : 2+1= 3

I. SYLLABUS

THEORY

Enzymes: Definition and classification, EC numbering of enzymes. Coenzymes, cofactors & isoenzymes.

Properties: Protein nature, enzyme-substrate complex formation, modern concept of the active center of enzyme. Specificity of enzyme action: Substrate specificity, group specificity, stereo or optical specificity.

Factors influencing enzyme action: Effects of temperature, pH, concentration of substrate and enzyme.

Enzyme units: International Units, Katal, turnover number & Specific activity.

Biological oxidation: Enzymes and coenzymes involved in oxidation and reduction viz. Oxidoreductases, oxidases, oxygenases, dehydrogenases, hydroperoxidases & cytochromes.

Respiratory chain/electron transport chain, oxidative phosphorylation, inhibitors, uncouplers and other factors influencing electron transport chain.


Lipid metabolism: Beta oxidation of fatty acids, ketone body formation, biosyntheses of fatty acids, triacylglycerol, phospholipids & lipoprotein metabolism. Bioenergetics of lipid metabolism.


Nucleic acids: Metabolism of purines and pyrimidines. DNA & RNA biosynthesis.

Integration of metabolism. Metabolic functions of macro and micro nutrients, metabolic functions of lipid and water soluble vitamins. Uses of isotopes in metabolic studies.

**PRACTICAL**


**SEMMESTER IV**

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<th>Course Title</th>
<th>Animal Biotechnology</th>
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**I. SYLLABUS**

**THEORY**

Definitions, basic concepts and scope of animal biotechnology. Recombinant DNA technology. Gene cloning, vectors and expression vectors. Transformation and transfection. Polymerised chain reaction (PCR), construction of genomic library and cDNA library. DNA sequencing. Principles of transfer of nucleic acids and proteins (Southern, Northern and Western blotting), Nucleic acid hybridization, DNA probes and DNA fingerprinting.

Biotechnological application in animal improvements:

Embryo biotechniques, *in-vivo* and *in-vitro* embryo production and preservation, sexing, micromanipulation and cloning, transgenic animal and biopharming.

Mapping of genome and genome sequencing. Marker assisted selection. Gene banking.

Nutritional biotechnology including bioconversion of lignocellulose, genetic manipulation of microbes for improved feed utilization and health. Animal tissue culture, transformation and cell lines, tumor markers and acute phase proteins.

Molecular diagnosis including PCR and DNA probes. Hybridoma and monoclonal antibodies. New generation vaccines: Subunit recombinant and recombinant vectored vaccines.

Fermentation process and technologies for milk, meat and leather. Ethics arid regulatory issues in Biotechnology. IPR. Bioinformatics.
PRACTICAL

DNA and plasmid isolation. Gel electrophoresis. PCR. Screening of gametes and embryo. Use of Multimedia and audio-visual aids for molecular biology aspects.

(The course is to be taught jointly with the Departments of Veterinary Microbiology and Veterinary Gynaecology and Obstetrics)
DEPARTMENT OF VETERINARY PHARMACOLOGY AND TOXICOLOGY

SEMESTER V

Veterinary Pharmacology Paper-I

Course Title : General and Systemic Veterinary Pharmacology
Course No. : VPT-311
Credit Hours : 2+1=3

I. SYLLABUS

THEORY


Drugs acting on digestive system: stomachics, antacids and antiulcers, prokinetics, carminatives, antizymotics, emetics, antiemetics, purgatives, antidiarrhoeals, cholerectics and cholagogues, Rumen pharmacology.

Drugs acting on cardiovascular system: cardiac glycosides, antiarrhythmic drugs, vasodilators and antihypertensive agents, haematinics, coagulants and anticoagulants.

Drugs acting on respiratory system: expectorants and antitussives, respiratory stimulants, bronchodilators and mucolytics.

Drugs acting on urogenital system: diuretics, urinary alkalizers, and acidifiers, fluid therapy, ecbolics and tocolytics.

Pharmacotherapeutics of hormones and vitamins.

Drugs acting on skin and mucous membranes: Emollients, demulcents and counter irritants.

Bio-enhancers, Immunostimulants and immunosuppressant.

New drugs and drug formulations.

PRACTICAL

Pharmacy appliances, Principles of compounding and dispensing.

### SEMESTER VI

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<th>Course Title</th>
<th>Veterinary Neuropharmacology</th>
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#### I. SYLLABUS

**THEORY**

Drugs acting on autonomic nervous system: Neurohumoral transmission, adrenoceptor agonists and antagonists, adrenergic neuron blockers, cholinoreceptors agonists and antagonists, ganglionic stimulants and blockers.

Autacoids: Histamine and antihistaminic agents, 5-Hydroxytryptamine and its antagonists, prostaglandins, angiotensin and bradykinin.

Drugs acting on central nervous system (CNS): Pharmacology of neurotransmitters. History of general anaesthetics and theories of anaesthesia. Inhalent, intravenous and dissociative anaesthetics; hypnotics and sedatives; tranquillizers, psychotropic drugs, anticonvulsants, opioid analgesic, non-steroidal anti-inflammatory drugs, analeptics and other CNS stimulants, central muscle relaxants.

Drugs acting on somatic nervous system: Local anaesthetics and peripheral muscle relaxants.

New drugs and drug formulations.

**PRACTICAL**

Demonstration of the effect of CNS depressants, analgesics, CNS stimulants, muscle relaxant, anticonvulsants, local anaesthetics in laboratory animals.

Demonstration of the action of adrenergic and cholinergic agonists and antagonists on isolated and intact preparations of the animals.

Alternate use of animals as model for demonstration.

### SEMESTER VII

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<th>Course Title</th>
<th>Veterinary Chemotherapy</th>
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#### I. SYLLABUS

**THEORY**

Antibacterial agents: Classification, general principles in antibacterial chemotherapy, antibacterial resistance. Sulphonamides and their combination with diaminopyrimidines, sulfones, nitrofurans, nalidixic acid and fluoroquinolones.


Antifungal agents: Topical and systemic agents including anti-fungal antibiotics.

Anthelmintics: Drugs used against cestodes, trematodes, nematodes, drug resistance, broad-spectrum anthelmintics.

Antiprotozoal agents: Drugs used in trypanosomosis, theileriosis, babesiosis, coccidiosis, amoebiosis, giardiosis and trichomoniasis.

Ectoparasiticides, Antiviral and anticancer agents, Antiseptics and disinfectants, Growth promoters.

Common indigenous drugs of plant origin with proven pharmacological and therapeutic efficacies in various animal ailments.

New drugs and drug formulations.
I. SYLLABUS

THEORY


Toxicity caused by metal and non-metals: Arsenic, lead, mercury, copper, selenium, molybdenum, phosphorus, nitrates and nitrites, common salt and fluoride.

Toxicity caused by plants and weeds: Cyanogenic plants, abrus, lantana, ipomoea, nerium, datura, nuxvomica, castor, selenium containing plants oxalate producing plants, plants causing thiamine deficiency.

Drug toxicity and toxicity caused by agrochemicals: organophosphates, carbamates, chlorinated hydrocarbons, pyrethroids, herbicides, fungicides, rodenticides and urea.

Residue toxicology: Hazards of residues, concepts of withdrawal time and MRLs, minimizing drug and toxic residues in animal products.

Venomous bites and sting: Snake bite, scorpion, spider, wasp stings and toad poisoning. Radiation hazards and industrial toxicants. Toxicity caused by food additives and preservatives.
I. SYLLABUS

THEORY


Classification of helminths. Characteristics of phylum (Planthelminthes, Nemathelminthes 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 helminths of animals and birds.

TREMATODES

Liver flukes (Fasciola, Dicrocoelium and Opithorchis), 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, Pseudodicus), Lung flukes (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 worms (Diphyllobothrium), Dwarf tape worm (Hymenolepis).

NEMATODES


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 trematode, cestode and nematode. Demonstration of the life cycle and development of the type species of Trematode, Cestode and Nematode.
SEMESTER IV

Course Title: Veterinary Entomology And Acarology
Course No.: VPA-221
Credit House: 1+1=2

I. SYLLABUS

THEORY

General description of insecta and arachnida affecting domestic animals and birds. Arthropoda as direct/indirect parasites. Classification. Life Cycle and vector potentiality in relation to disease transmission, pathogenesis and control of following arthropods affecting animals and birds.

The biting midges (Culicoides), buffalo/Black fly, gnats (Simulium), sandflies (Phlebotamus). The mosquitoes (Culex, Anopheles and Aedes). Horse fly (Tabanus), Musca, Stomoxys, Sarcophaga, Warbles (Hypoderma) and bots (Gasterophilus), Nasal bot (Oestrus ovis), Myiasis, Wingless flies (Hippobosca, Melophagus), bugs, lice (Haematopinus, Linognathus, Trichodectus, Damalina, Menopon, Lipeurus, Menacanthus (Poultry lice). Fleas (Pulex, Ctenocephalides, Echidonophaga, Xenopsylla). Arachnids (Ticks and mites of Veterinary importance. Soft tick (Argasidae), (Argus, Orthinodorus and Otobius).

Hard ticks (Boophilus, Hyalomma, Rhipicephalus, Haemophysalis, Amblyomma, Ixodes), Mites (Demodex, Sarcoptes, Psoroptes, Notoedres, Chorioptes). Anti-tick immunoprophylaxis. Damages to hide and skins due to ectoparasitic infestation.

PRACTICAL

Demonstration of the type representatives of various groups of insects, ticks and mites through charts, specimen and mounted slides. Demonstration of different characters of Insecta and Arachnida (Tick and mites). Procedure for diagnosis of arthropod infestation to hides and skin. Demonstration of enteric myiasis, Procedures for the collection, fixation, preservation and mounting of arthropods parasites.

SEMESTER IV

Course Title: Veterinary Protozoology
Course No.: VPA-222
Credit House: 2+1=3

I. SYLLABUS

THEORY

Introduction and general description to protozoa and their development. Differentiation from protophyta, bacteria and rickettsia, Classification. Life cycle in relation to transmission pathogenesis, diagnosis and control of protozoa of Veterinary importance. Kalazar (visceral and Cutaneous leishmaniasis, Animal Trypanosomosis (Surra), Trypanosomosis (due to African Trypanosoma) in cattle and man.

Bovine and avian trichomonosis, black head in turkeys (Histomomas), Bovine amoebae (Entamoeba and Balantidium), Giardia sp. Coccidia and coccidiosis of poultry and animals. Cryptosporidiosis, Cyst forming coccidian (Toxoplasma, Sarcocystis), Neospora (Neospora caninum), Malaria parasite of animals and poultry (Plasmodium and Haemoproteus), Piromplasmosis (Babesia), Theilerosis (Theileria).

Recent developments in protozoan vaccines for field use. International regulations for control of different protozoan diseases.

PRACTICAL

DEPARTMENT OF MICROBIOLOGY

SEMMESTER III

Course Title: General Veterinary Microbiology  
Course No.: VMC-211  
Credit Hours: 1+1=2

I. SYLLABUS

THEORY


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, Antiibiogram, Phenol coefficient test, Slide culture technique for fungus.

SEMMESTER IV

Course Title: Veterinary Immunology And Serology  
Course No.: VMC-221  
Credit Hours: 1+1=2

I. SYLLABUS

THEORY


PRACTICAL

Preparation of antigen, Raising of antisera, Concentration of immunoglobulins, Agglutination (plate, tube), Precipitation {Agar gel precipitation test (AGPT), Crossed immunoelctrophoresis (CIE), Rocket immunoelctrophoresis (RIE), Indirect agglutination (Latex co-agglutination, Passive haemagglutination (PHA), Reversed passive haemagglutination (RPHA)}, Haemagglutination, Complement fixation test, immunoperoxidase test (IPT), Fluorescent antibody technique (FAT), Enzyme linked immunosorbent assay (ELISA), Cell mediated immune (CMI) response, Veterinary biologicals (visits and appraisal).
SEMESTER V

Course Title : Systematic Veterinary Bacteriology And Mycology  
Course No. : VMC-311  
Credit Hours : 2+1=3

I. SYLLABUS

THEORY

Study of following important pathogenic bacteria and fungi in relation to their morphology, isolation, growth colonial, biochemical and antigenic characters. Pathogenicity and diagnosis of bacterial and fungal disease caused by the following genera:
Bacteria: Staphylococcus, Streptococcus, Bacillus, Clostridium, Mycobacterium, Enterobacteriaceae (E. coli, Salmonella, Yersinia, Klebsiella and Proteus), Campylobacter, Brucella, Pasteurella and Mannheimia, Pseudomonas and Burkholderia, Moraxella, Haemophilus and Taylorella, Listeria, Actinobacterius, Actinomyces, Arcanobacterium and Corynebacterium, Nocardia, Dermatophilus, Spirochetes, Gram negative anaerobes, Mycoplasma, Rickettsia, Chlamydia and Chlamydophila. 

PRACTICAL

Laboratory identification of agents of mastitis, Haemorrhagic septicaemia, Enteric infections, Brucellosis, Tuberculosis and Johne’s disease, Clostridial infections, Wooden tongue and Lumpy jaw, Anthrax, Glanders, Aspergillosis, Dermatophytosis, Demonstration of other agents of importance (Phycomycetes, yeasts etc.).

SEMESTER VI

Veterinary Microbiology Paper-II

Course Title : Systematic Veterinary Virology  
Course No. : VMC-321  
Credit Hours : 2+1=3

I. SYLLABUS

THEORY


PRACTICAL

Glassware and media preparation, Demonstration of Cell culture, Virus propagation by egg inoculation, animal inoculation and cell culture, study of cytopathogenesis, viral inclusions, diagnostic procedures, serological techniques, preservation and transportation of clinical samples for virological investigations. Diagnostic procedures for Peste des petits ruminants (PPR), FMD, Ranikhet disease (RD), Blue tongue, Infectious bronchitis (IB), Infectious bursal disease (IBD) and other viral agents.
DEPARTMENT OF VETERINARY PATHOLOGY

SEMESTER III

Course Title : General Veterinary Pathology  
Course No. : VPP-211  
Credit hours : 1+1=2  

I. SYLLABUS

THEORY

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


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, Photosensitizational 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.) technique, Collection of morbid materials for pathological diagnosis. Techniques for preservation and dispatch 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.

SEMESTER IV

Course Title : Systemic Veterinary Pathology  
Course No. : VPP-221  
Credit hours : 2+1=3  

1. SYLLABUS

THEORY

Pathological changes including neoplasms in non-infectious disease conditions affecting Digestive System (mouth, pharynx, salivary glands, oesophagus, stomach, intestines, liver, gall bladder, pancreas), Respiratory System (nasal cavity, larynx, bronchi, trachea, lungs and pleura), Musculo-skeletal system (muscle, bone, joints, ligaments, tendons), Cardio-vascular System (pericardium, myocardium, epicardium, endocardium, arteries, veins), Haemopoietic System (bone marrow), Lymphoid System
PRACTICAL

Post-mortem examination of large and small animals, recording of gross lesions and compiling the post-mortem report (including vetero-legal cases), dispatch of morbid material in vetero-legal cases, study of gross specimens and histopathological slides pertaining to systemic pathology. Collection and examination of clinico-pathological specimens (blood, urine, body fluids, etc.) for diagnosis of systemic affections.

SEMESTER V

Veterinary Pathology Paper-II
Course Title : Special Veterinary Pathology
Course No.  : VPP-311
Credit hours : 2+1=3

I. SYLLABUS

THEORY


General pathology of bacterial infections, pathogenesis, gross and microscopic pathology of Tuberculosis, Johne's disease, actinomycosis, actinobacillosis, anthrax, clostridial group of diseases, streptococcosis including strangles in horses, staphylococcosis, glanders, pasteurellosis, leptospirosis, listeriosis, swine erysipelas, brucellosis, corynebacterium infections, nocardiosis, campylobacteriosis, hemophilus, salmonellosis and colibacillosis in swine.

General pathology of mycoplasmal, chlamydial and rickettsial infections and their differentiation. Pathogenesis, gross and microscopic pathology of contagious bovine pleuropneumonia (CBPP), contagious caprine pleuropneumonia (CCPP), porcine enzootic pneumonia, chlamydial group of diseases and anaplasmosis, Q- fever and ehrlichiosis.

General pathology of mycotic infections. Pathogenesis, gross and microscopic pathology of superficial and deep mycoses- ringworm, favus, aspergillosis, zygomycosis, histoplasmosis, cryptococosis and candidiasis.

General pathology of helminthic and protozoal infections. Pathogenesis, gross and microscopic pathology of facioliasis, amphistomiasis ascariasis, strongylosis, hemonchosis, spirocercosis, filariasis, hookworm, tapeworm infections, coccidiosis, toxoplasmosis, babesiosis, thileriasis and trypanosomiasis.

Pathological changes in nutritional and metabolic diseases. (Deficiency/ excess of carbohydrates, proteins, fats, minerals and vitamins and in conditions like milk fever, pregnancy toxaemia, post-parturient hemoglobinuria, ketosis, hypomagnesemic tetany, azoturia, piglet anaemia and sway back/ enzootic ataxia and Rheumatism like syndrome).

General pathology of toxicosis. Pathogenesis, gross and microscopic pathology of heavy metal toxicities like arsenic, copper, lead, mercury, cadmium, strychnine, nitrate/ nitrite, hydrocyanic acid (HCN), fluoride, oxalate toxicities, insecticide/ pesticide poisoning, pathogenesis, gross and microscopic pathology of aflatoacosis, ochratoxocosis, trichotheccosis and ergotoxicosis, Pathology of exotic and emerging diseases.
PRACTICAL

Post-mortem examination of large and small animals for diagnosis of special diseases. Study of gross lesions particularly those of pathognomonic significance. Study of histopathological slides pertaining to special pathology including special staining of causative agents. Study of rapid diagnostic techniques like biopsy exfoliative cytology and frozen sectioning.

SEMESTER VI

Course Title : Avian Pathology
Course No. : VPP-321
Credit hours : 1+1=2

1. SYLLABUS

THEORY


Bacterial Diseases: Pathogenesis, gross and microscopic pathology of colibacillosis (colisepticaemia, yolk sac infection, egg peritonitis, coligranuloma), infectious coryza, clostridial diseases (botulism, necrotic enteritis, gangrenous dermatitis, ulcerative enteritis), salmonellosis (pulorum disease, fowl typhoid, paratyphoid infection), fowl cholera, tuberculosis and spirochaetosis.

Mycoplasmal and Chlamydial Diseases: Pathogenesis, gross and microscopic pathology of Mycoplasma gallisepticum infection (chronic respiratory disease), Mycoplasma synoviae infection, Avian chlamydiosis (psittacosis).

Fungal Diseases: Pathogenesis, gross and microscopic pathology of aspergillosis, thrush and favus.

Mycotoxicosis: Pathogenesis, gross and microscopic pathology of Aflatoxicosis, ochratoxicosis and trichotheccosis.

Parasitic Diseases: Pathogenesis, gross and microscopic pathology of Helminthic diseases (flukes, cestodes, nematodes), protozoal diseases (coccidiosis, histomoniasis), ectoparasites, avian malaria.

Nutritional and metabolic diseases: Pathogenesis, gross and microscopic pathology of major diseases due to deficiency/excess of carbohydrates, proteins, minerals and vitamins in poultry.

Vices and Miscellaneous Diseases: Pathology of important vices and miscellaneous conditions. Pathology of exotic and emerging poultry diseases.

PRACTICAL


Study of gross specimens and histopathological slides of different diseases of poultry.
SEMESTER VI

Course Title : Aquatic Animal Diseases, Health Care And Management.
Course No. : VPP-322
Credit hours : 1+1=2

I. SYLLABUS

THEORY


OIE regulations related to aquatic animal health.
Viral, bacterial, mycotic and parasitic diseases affecting aquatic animals. Nutritional and toxic pathology, miscellaneous non-infectious diseases associated with physicochemical abnormalities of water. Neoplasia of teleosts.
Vaccines and vaccination.

PRACTICAL


(To be taught jointly with Departments of Livestock Production Management and Veterinary Medicine)
I. SYLLABUS

THEORY


PRACTICAL

I. SYLLABUS

THEORY


PRACTICAL


Field survey of zoonotic diseases. Concurrent isolation and identification of important pathogens of zoonotic importance from animal and human sources including foods of animal origin and their interpretation. Study of rural environment and health status of rural community. Visit to primary health centre/human hospital and study of the common diseases affecting rural/urban population, and probable relationships of these human disease conditions with animal diseases present in the area.

**PRACTICAL**

DEPARTMENT OF ANIMAL NUTRITION

SEMESTER I

Course Title : Principles of Animal Nutrition and Feed Technology
Course No. : ANN-111
Credit Hours : 2+1=3

I. SYLLABUS

THEORY


PRACTICAL


SEMESTER II

Course Title : Applied Nutrition- 1 (Ruminants)
Course No. : ANN-121
Credit Hours : 2+1=3

I. SYLLABUS

THEORY

Importance of scientific feeding conducting/Feeding experiments. Digestion and metabolism trial. Norms adopted in conducting digestion trial. Measurements of digestibility. Factors affecting digestibility of feeds. Feeding standards, their uses and significance, Merit and demerits of various feeding standards with reference to ruminants. Nutrients requirements of livestock 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, milk, meat wool and work. Balanced ration and its characteristics, general principles of computation of rations. Formulation of rations and feeding of dairy cattle and buffaloes during different phases of growth, development and production (neonate, young, mature, pregnant, lactating and dry animals; breeding bull and working animals). Formulation of ration and feeding of sheep and goat during different phases of growth, development and production (milk, meat and wool). Use of NPN compound for ruminants.

9


**PRACTICAL**

Demonstration of conducting digestion trial in ruminants. Calculation of nutritive value of different feedstuffs in terms of digestible crude protein (DCP), total digestible nutrient (TDN), nitrogen retention (NR) and starch equivalent (SE). Calculation of requirements of nutrients in terms of DCP, TDN and metabolisable energy (ME) for maintenance, growth and other types of production like meat, milk, wool, reproduction and work. Formulation of rations for different categories of livestock under different conditions. Demonstration of the methods for improving the nutritive quality of straws and other crop residues. Formulation of rations for feeding of livestock during scarcity periods. Visit to feed factories.

**SEMESTER III**

Course Title : Applied Nutrition-II  
(Non ruminants, Poultry and Laboratory Animals)  
Course No. : ANN-211  
Credit Hours : 2+1=3

**I. SYLLABUS**

**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 non ruminant animals and poultry. Feeding of swine (piglets, growers, lactating and pregnant sows, breeding boar, fattening animals), equine (foal, yearling, brood mare, 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.
SEMESTER I

Course Title : Bio-Statistics and Computer Application
Course No. : AGB-111
Credit Hours : 2+1=3

I. SYLLABUS

THEORY

A. Basic Statistics


C. Computer Application


PRACTICAL


DEMONSTRATION

Use of word processor and spreadsheet. Graphics and their uses. Data retrieving and analysis through computer (Data base). Use of local area network (LAN) and other network systems. Retrieving library information through network. G.I.S. and its use.

SEMESTER II

Course Title : Principles Of Animal Genetics And Population Genetics
Course No. : AGB – 121
Credit Hours : 2 + 1=3

I. SYLLABUS

THEORY

History of Genetics, Chromosome numbers and types in livestock and poultry, Mitosis, Meiosis and gametogenesis. Overview of Mendelian principles; Modified Mendelian inheritance: gene interaction; multiple alleles; lethals; sex-linked, sex limited and sex influenced traits; linkage and crossing over,
Mutation, Chromosomal aberrations; Cytogenetics, Extra-chromosomal inheritance. Gene concept – classical and molecular.

Population genetics: Forces (e.g. Mutation, migration, selection and drift) changing gene and genotypic frequencies.

Quantitative genetics; Nature and properties; Values and means, Components of phenotypic and genotypic variance; Concept of genotype and environment interaction, resemblance between relatives; Heritability, repeatability, genetic and phenotypic correlations.

**PRACTICAL**

Demonstration of Karyotype of Farm animal species; Solving problems on inheritance of Mendelian traits, Linkage and Crossing over. Calculation of gene and genotypic frequencies, Testing a population for Hardy-Weinberg equilibrium; Calculation of effects of various forces that change gene frequencies; computation of population mean; Estimation of heritability, repeatability, Most probable producing ability (MPPA), genetic and phenotypic correlations.

**SEMESTER III**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Livestock and Poultry Breeding</th>
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<tr>
<td>Course No.</td>
<td>VGB – 211</td>
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<tr>
<td>Credit Hours</td>
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</tbody>
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**I. SYLLABUS**

**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; Basis of selection individual, pedigree, family, sib, progeny and combined; Indirect selection; Multi-trait selection.

Classification of mating systems; Inbreeding and outbreeding- genetic and phenotypic consequences viz., inbreeding depression and heterosis: Systems of utilization of heterosis; 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, swing 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 and 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.
I. SYLLABUS

THEORY

Livestock in India association of livestock to Indian society during vedic, medieval and modern era. Demographic distribution of livestock and role in economy. Animal holding and land holding patterns in different agro-ecologies.


General principles affecting the design and construction of building for housing for various livestock species. Selection of site. Arrangements of the building with special reference to Indian conditions. Utilisation of local materials. Building materials used for construction of wall, roof and floor of animal houses, their characteristics, merits and demerits.


PRACTICAL

Identification of various breeds of cattle, buffalo, sheep and goat. Familiarization with body points of animals. Approaching, handling and restraining of cattle, buffalo, sheep and goat. Clipping, shearing, dipping, spraying and spotting sick animals. Detection of vices. Feeding of animals. Methods of identification (marking, tattooing, branding, tagging and electronic chip). Determination of age. Determination of body weight using different measurements. Preparation of animals for show and

**SEMESTER II**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Fodder Production and Grassland Management</th>
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<tr>
<td>Course No.</td>
<td>LPM -121</td>
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<tr>
<td>Credits Hours</td>
<td>1+1=2</td>
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**I. SYLLABUS**

**THEORY**

Importance of grasslands and fodders in livestock production. Agronomical practices for production of leguminous and non leguminous fodders in different seasons. Soil and water conservation and irrigation drainage for fodder production. Farm power and agro-energy. Farm machinery and equipment. Harvesting and post harvest techniques for fodder preservation. Storage of feeds and fodders. Scarcity fodders. Feed and fodder management for individual animals. Fodder production for small units through inter cropping or back yard cultivation. Recycling of animals washings and wastes in fodder production.

**PRACTICAL**

Visit to the fodder farm. Familiarization with the various types of fodder crops utilized in the state and the samples of fodder in India. Fodder cropping routines – familiarization, collection, preservation and storage of feed and fodder, possible damages/loss and methods to prevent them. Cost calculations of fodder production. Familiarizations with the back yard fodder cropping and intercropping of fodder. Livestock waste utilization and recycling. Calculation on the economic aspects of fodder cropping and procurement of feed.

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Livestock Production Management-II</th>
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<tbody>
<tr>
<td>(Monogastric and Laboratory Animals)</td>
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<tr>
<td>Course No.</td>
<td>LPM -122</td>
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<tr>
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<td>1+1=2</td>
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</tbody>
</table>

**I. SYLLABUS**

**THEORY**

Importance of laboratory animal breeding care and housing standards of mice, rats and guinea pigs. General considerations on feeding and breeding of laboratory animals. Prophylactic measures for commonly occurring laboratory animal diseases. Concept of production of specific pathogen free (SPF) and germ free laboratory animals.


**PRACTICAL**


Identification of body parts and handling of laboratory animals. Housing system and space requirements for laboratory animals. Weighting sexing and weaning of laboratory animals. Marketing of swine. Feeding of swines. Preparation of swines for show and judging.

Identification of body parts and handling animals. Housing system and space requirements for laboratory animals. Weighting, sexing and weaning of laboratory animals. Marking for identification of laboratory animals for purpose of their individual recording. Computation and compounding of balanced diet for laboratory animal mainly Mice, Rats, Guinea-pigs and Rabbits. Feeding schedule of laboratory animals for high breeding efficiency. Maintenance of breeding records of laboratory animals. Prophylactic measures against common disease of lab animals. Hygienic care and control of parasites (routines).


Horse riding: walking, trotting, cantering and galloping. Preparation of equines for show and judging. Layout plans for stables.

**SEMESTER III**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Avian Production Management</th>
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<tbody>
<tr>
<td>Course No.</td>
<td>LPM-211</td>
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<tr>
<td>Credits Hours</td>
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**I. SYLLABUS**

**THEORY**

Indian Poultry Industry brief outline of the different segments poultry statistics. Classification of poultry, common breeds of poultry including duck, quail, turkey and guinea fowl and their descriptions. Descriptions 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 eco-system.


**PRACTICAL**


**SEMESTER IV**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Commercial Poultry Production &amp; Hatchery Management</th>
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<tr>
<td>Course No.</td>
<td>LPM -221</td>
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<tr>
<td>Credits Hours</td>
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**I. SYLLABUS**

**THEORY**


**PRACTICAL**


**SEMESTER IV**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Mule Production and Management</th>
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<tbody>
<tr>
<td>Course No.</td>
<td>LPM-222</td>
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<tr>
<td>Credit hours</td>
<td>1+1=2</td>
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</table>

**I. SYLLABUS**

**THEORY**


**PRACTICAL**

DEPARTMENT OF LIVESTOCK PRODUCTS TECHNOLOGY

SEMESTER V

Course Title: Milk and Milk Products Technology
Course No.: LPT-311
Credit Hours: 1+1=2

I. SYLLABUS

THEORY


PRACTICAL


SEMESTER V

Course Title: Abattoir Practices And Animal Products Technology
Course No.: LPT-312
Credit Hours: 1+1=2

I. SYLLABUS

THEORY


PRACTICAL

Methods of ritual and humane slaughter, flaying and dressing of food animals including poultry. Carcass evaluation. Determination of meat yield, dressing percentage, meat bone ratio and cut up parts. Preparation of different abattoir byproducts. Visit to leather processing unit and slaughter houses/meat plants.

Wool sampling techniques, determination of fleece density, fiber diameter, staple length, crimp and medulation percentage, scouring/clean fleece yield. Visit to wool production/processing centre.
I. SYLLABUS

THEORY


PRACTICAL

DEPARTMENT OF VETERINARY GYNAECOLOGY AND OBSTETRICS

SEMESTER VII

Course Title : Veterinary Gynaecology
Course No. : VGO-411
Credit Hours : 2+1=3

I. SYLLABUS

THEORY


Induction of estrus, Synchronization of estrus, Follicular Dynamics, Ovulation, Superovulation, and Embryo Transfer Technology. Immuno-modulation for enhancement of fecundity.

PRACTICAL


SEMESTER VIII

Course Title : Veterinary Obstetrics
Course No. : VGO-421
Credit Hours : 1+1=2

I. SYLLABUS

THEORY


Postpartum diseases and complications: uterine prolapse, retention of foetal membranes, metritis, postpartum paraplegia.

Animal birth control- ovariohysterectomy and non surgical interventions.
PRACTICAL


SEMESTER IX

Course Title : Veterinary Andrology and Reproductive Techniques
Course No.  : VGO-511
Credit Hours : 1+1=2

I. SYLLABUS

THEORY


PRACTICAL

I. SYLLABUS

THEORY


PRACTICAL


Anaesthesiology

THEORY (Region Specific)


PRACTICAL

Familiarization with anaesthetic apparatus, Endotracheal tubes. Laryngoscope, gadgets for monitoring. Pre anaesthetic preparation, induction of general anaesthesia in small and large animals and Endotracheal intubation in dogs. Demonstration of inhalant anaesthesia, monitoring of general anaesthesia and the management of anaesthetic emergencies. Use of artificial/assisted respiration. Various methods of local infiltration anaesthesia and regional block for surgical procedures of different regions of body in large and small animals. Chemical restraint of lab and wild animals (visit of a wild animal facility and audiovisual aids).

Diagnostic Imaging

THEORY

**PRACTICAL**


Familiarization with film contrasts, density and detail, common defects of X-ray films. Radiographic anatomy and interpretation of radiographic lesions. Demonstration of contrast technique in small animals. Familiarization with ultrasonography of small and large animals (demonstration).

**SEMESTER VIII**

<table>
<thead>
<tr>
<th>Title of Course</th>
<th>Regional Veterinary Surgery</th>
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<tbody>
<tr>
<td>Course No.</td>
<td>VSR-421</td>
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<tr>
<td>Credit Hours</td>
<td>2+1=3</td>
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**I. SYLLABUS**

**THEORY**

**Head and Neck**


**Thorax and abdomen**


**PRACTICAL**

**Head and Neck**


**Thorax and Abdomen**

SEMESTER IX

Title of Course: Veterinary Orthopaedics and Lameness
Course No.: VSR-511
Credit Hours: 1+1=2

I. SYLLABUS

THEORY


PRACTICAL

Examination of the horse for confirmation of body (head, trunk, fore limbs and hind limbs) and diagnosis of lameness. Demonstration of equine shoeing. First aid in orthopaedic patients (splint application, Robert Jones’s bandage) plaster of paris cast-application in dogs and calves. Hanging pin and trasfixion pinning (demonstration) intra medullary pinning in dogs (demonstration). Diagnostic nerve block in equine (demonstration) demonstration of: claw trimming of bovine foot, neurological examination for evaluation of spinal trauma, tenectomies of lateral digital extensor tendon, medial patellar desmotomy, techniques and application of diathermy, electrical stimulators, ultrasonic, therapy, infra red and ultra-violet rays.

(Courses on zoo/wild animals breeding, nutrition, management and health care under VMD-512 (2+1) and pet/companion animal breeding, feeding, management and health care under VMD-513 (1+1) shall be taught jointly by departments of Veterinary Medicine, Livestock Production Management, Animal Genetic and Breeding, Animal Nutrition, Veterinary Pathology and Veterinary Surgery and Radiology).
DEPARTMENT OF VETERINARY MEDICINE

SEMESTER VII

Course Title : Veterinary Clinical Medicine – I  
(General & Systemic)
Course No. : VMD–411
Credit Hours : $2+1 = 3$

I. SYLLABUS

THEORY


PRACTICAL

Clinical examination and diagnosis: Methods of clinical examination of invidual ailing animals including history taking. Examination of animal including behaviour and general appearance: demeanour, voice, eating, drinking, defecation, urination, posture, gait, condition of skin and body coats. Inspection of body: examination of head and neck, thorax, respiratory rates, rhythm, respiratory depth, type of respiration, cardiac sounds, chest symmetry, abdomen, external genitalia, mammary glands and limbs. Physical examination: temperature taking, palpation, percussion, auscultation. Examination of ears, eyes, conjunctiva, eye balls, mouth, submaxillary and other superficial lymph nodes, jugular furrow, oesophagus, trachea. Passing of stomach tube for locating obstruction if any. Examination of specific condition of thorax: pneumothorax, haemothorax and hydrothorax. Percussion/auscultation of lung and cardiac areas. Examination of abdomen: ruminal motility, consistency, microbial population and their motility in ruminal fluid, use of trochar and canula. Examination of liver and kidneys. Liver and kidney function tests.

SEMESTER VII

Course Title : Veterinary Preventive Medicine-I 
(Bacterial, Fungal & Rickettsial Diseases)
Course No. : VMD–412
Credit Hours : $2+0=2$

I. SYLLABUS

THEORY

Clinical manifestation, diagnosis, prevention and control of infectious diseases, namely Mastitis, Haemorrhagic septicaemia, Brucellosis, Tuberculosis, Johne’s disease, Black quarter, Tetanus, Listeriosis, Leptospirosis, Campylobacteriosis, Actinomycosis, Actinobacillosis, Enterotoxaemia, Glanders, Strangles, Ulcerative lymphangitis, Colibacillosis, Fowl typhoid, Pulorium disease, Fowl cholera, Avian mycoplasmosis, Spirochaetosis, Salmonellosis, Swine erysipelas. Other important bacterial diseases of regional importance (e.g. Contagious caprine pleuropneumonia, Contagious bovine pleuropneumonia, etc.) Bacterial diseases of bio-terrorism importance- Anthrax, Botulism, etc. Chlamydiosis, Q fever, Anaplasmosis. Dermatophilosis, Aspergillosis (Brooders pneumonia), Candidiasis, Histoplasmosis, Sporotrichosis, Coccidiomycosis, Mycotoxicosis, etc.
I. SYLLABUS

THEORY

Aetiology, clinical manifestations, diagnosis, differential diagnosis, treatment, prevention and control of metabolic disorders/production diseases. Milk fever, acute parturient hypocalcaemia in goats, sows and bitches, osteodystrophy fibrosa, lactation tetany in mares, downer cow syndrome, ketosis, hypomagnesemia in cattle and buffalo, azoturia in equines, hypothyroidism and diabetes in dogs. Diagnosis and management of diseases caused by deficiency of iron, copper, cobalt, zinc manganese, selenium, calcium, phosphorus, magnesium, vitamin A, D, E, B complex, K and C in domestic animals and poultry.


I. SYLLABUS

THEORY

SEMESTER IX
Course Title : Animal Welfare, Ethics And Jurisprudence
Course No. : VMD-511
Credit Hours : 2+0 = 2

I. SYLLABUS
THEORY

SEMESTER IX
Course Title : Zoo/Wild Animal Breeding, Nutrition, Management And Health Care
Course No. : VMD–512
Credit Hours : 1+1 = 2

I. SYLLABUS
THEORY
Taxonomy of various genera of wild/zoo animals of India along with their descriptions. Ethology of wildlife species. Basic principles of habitat and housing of various classes of wild and zoo animals. Population dynamic of wild animals, effective population size of wild animals in captivity/zoo/natural habitats. Planned breeding of wild animals. Controlled breeding and assisted reproduction. Breeding for conservation of wild animals.

Feeding habits, feed and feeding schedules of zoo animals; Nutrient requirements of wild animals. Diet formulation and feeding of various age groups, sick and geriatric animals.

Restrain, capture and handling, physical examination and transport of wild and zoo animals. Principles of anesthesia, anesthetics, chemicals of restraining, common surgical interventions. Capture myopathy.

Principles of zoo hygiene, public health problems arising from zoos. Prevention, control and treatment of infectious, parasitic, nutritional and metabolic disease in zoo and wild animals. Acts and Rules related to wild and zoo animals. National and international organizations and institutions interlinked to wild and zoo animals – role and functioning.
**PRACTICAL**

Visit of nearby sanctuary/zoo/wild animals center to study the care and management, restraint, examination, administration of medicine etc. in zoo animals. To study housing, feeds and feeding schedule of zoo animals.

To study implementation of various acts and rules related to zoo animals care and management. Postmortem examination of wild and zoo animals. Handling, processing and interpretation of pathological materials from zoo and wild animals. Attending to common surgical interventions on zoo and wild animals.

Planning for balanced feeding. Diet charts, preparation of balanced diet for new born, growing and sick animals as oral and intravenous feeds. Preparation of modified diet under selected conditions. Hygienic preparation, preservation and storage of foods.

(This course shall be taught jointly with the Departments of Veterinary Medicine Livestock Production Management, Animal Nutrition, Animal Genetics and Breeding, Veterinary Pathology, and Veterinary Surgery and Radiology)

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**SEMESTER IX**

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<tr>
<th>Course Title</th>
<th>Pet Animal Breeding, Management, Nutrition And Health Care</th>
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<td>VMD–513</td>
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<td>Credit Hours</td>
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**I. SYLLABUS**

**THEORY**

Breeding of dogs – International pedigree breeds and those commonly seen in India.

Pedigree sheet and major breed trials. Detection of oestrus and breeding of dogs. Selecting a breed to keep, selection of a pup.

Feeding of dogs – nutritional requirements of important breeds and different age groups.


Common diseases affecting dogs (bacterial, viral, parasitic, fungal, nutritional etc.), their clinical manifestations, diagnosis, treatment and control. Vaccination/ deworming schedules.


Common pet birds seen in India. Introduction to their caging, breeding, feeding, management, disease control and prevention.

**PRACTICAL**


Vaccination and surgical interventions (nail clipping, docking, sterilization).

Common breeds of cats, handling, restraint, examination, medication and surgical intervention in cats and kittens.

Identification of common pet birds – Handling of pet birds, their examination and administration of medicines.

(This course shall be offered jointly by the Departments of Veterinary Medicine, Livestock Production Management, Animal Nutrition, Animal Genetics and Breeding, Veterinary Pathology and Veterinary Surgery and Radiology).
I. SYLLABUS

THEORY

Concept of Sociology. Man-animal relationship (Society, Community, Association, Institutions). Difference in livestock production practices of rural, urban and tribal communities including rearing patterns. Social change and factors of change. Social groups, its types and functions. Social transformation in relation to animal rearing.


Role of animals in economy, health and socio-psychology and rural, semi urban and urban society. Client and stakeholder dealings: techniques and procedures including tools for data collection. Analysis history taking, follow-up and appraisal on prognosis. Adoption and diffusion of livestock innovations. Leadership and role of leaders in animal husbandry extension.

Farming in rural India-large and small scale farming, mixed farming, co-operative and collective farming, operatives: Economic principles underlying co-operative societies, co-operative milk unions in India.

Social survey and its types. Social sampling Identification of key communicators and operating through programmes. Identification of constraints in the adoption of improved animal husbandry practices.


PRACTICAL


Group discussions, techniques and procedures for awareness campaigns on different veterinary and ectoparasites, pail feeding of calves, sexing and culling of birds, first and for minor wounds, disinfection of byres, branding, use of horn cauterization of feeds and feeding schedules, deworming, preventive hygiene, vaccination etc. Organization of an imal welfare camps, exhibition, livestock shows etc. Hands on training in the use of computers for teaching and information dissemination. Rapid Rural Appraisal/Participatory Rural Appraisal in identifying livestock production/health care practices.
SEMESTER VI

Course Title: Livestock Economics, Marketing And Business Management
Course No.: VAE-321
Credit Hours: 2+1=3

I. SYLLABUS

THEORY

Economics:
Introduction, definition and scope (production, consumption, exchange and distribution) of economic principles as applied to livestock. Common terms-wants, goods, wealth, utility, price, value, real and money income. Important features of land, labour, capital and organization.

Marketing:
Import and export of animal and animal products. International Agreements/Regulations (WTO and General Agreement on Trade and Tariff-GATT) for marketing/trade of live animals and products.

Management:

Accounting:
Definition, objectives, common terms. Different systems of book keeping-single and double entry system. Various types of account books including books of original entry. Classification of accounts and rule of debit and credit. Recording of business transactions. Analysis of financial accounts-income and expenditure accounts, trading account, profit and loss accounts.

PRACTICAL

Book keeping; general entry, writing of journal and ledger, cash book (two and three column), purchase-sale and purchase-sale return registers, trading account, profit and loss accounts, income and expenditure accounts, balance sheet, bills of exchange (bill or receivable and bill of payable), bank expenditure accounts, balance sheet, bills of exchange (bill of receivable and bill of payable), bank reconciliation statement.
Economics of a dairy unit, poultry, piggery, sheep and goat units. Visit to farms, markets and cattle fairs, backyard units and preparation of report.
SEMESTER IX

Course Title : Livestock Entrepreneurship
Course No.   : VAE-511
Credit Hours : (1+0 =1)

I. SYLLABUS

THEORY

Livestock entrepreneurship. Avenues of entrepreneurship /employment in private and public sectors. Key concepts and theories of self employment and entrepreneurship. Essential criteria for development of entrepreneurship livestock sector – basic requirements for entrepreneurship initiatives in livestock and allied sectors (i.e. techno economic feasibility of the enterprises under different conditions, training and management skills, business acumen, business communication, inter-personnel skills for establishing enterprise.) Entrepreneurial training/development programmes at the State and National level. Animal Insurance, Bank support for entrepreneurship/financial credit and financial management-general principles and practices, analysing projects appraisals and reports, capital expenditures, decisions, reinvestment and payback. Preparing projects for bank appraisal, banking requirements. Assessing projects, profits. Procurement management, quality issues, standardization, grading and packaging. Marketing channels. Retail marketing, sales operations and management, advertising, marketing of services. Approach to preparation of entrepreneurial projects on livestock.
TEACHING VETERINARY CLINICAL COMPLEX (TVCC)

A. VETERINARY CLINICAL PRACTICE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Semester</th>
<th>Credit Hour</th>
<th>Hours</th>
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<tbody>
<tr>
<td>VCP-411</td>
<td>VII</td>
<td>0+5=5</td>
<td></td>
</tr>
<tr>
<td>VCP-421</td>
<td>VIII</td>
<td>0+5=5</td>
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</tr>
<tr>
<td>VCP-511</td>
<td>IX</td>
<td>0+5=5</td>
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Total: 15

The students shall be imparted the trainings on rotation basis in the following sections of Teaching Veterinary Clinical Complex (TVCC) with help of academic staff of veterinary Medicine, Veterinary Gynaecology and Obstetrics, Veterinary Surgery and Radiology and Veterinary Pathology specialization:

1. Ambulatory Section:

Handling, examination, diagnosis and treatment of sick animals under field conditions under the supervision of faculty designated for Ambulatory Clinical activity. Ambulatory Clinics shall be operated by small groups of students and faculty through an equipped mobile unit in which the departments of Veterinary Medicine, Veterinary Gynaecology and Obstetrics and Veterinary Surgery and Radiology shall be involved.

2. Diagnostic Laboratory Section:

The Clinical Diagnosis Laboratory will form an important component of Teaching Veterinary Clinical Complex. The Diagnostic Laboratory will impart training to groups of students for laboratory evaluation and interpretation of clinical samples leading to diagnosis/comparative diagnosis of diseases. This activity will involve training in examining clinical samples (biochemical, toxicological, pathological, parasitological and bacteriological) at the clinical complex, analyzing and correlating with clinical findings and interpreting the results.

3. Medicine Section:

Orientation to Veterinary Clinics including hospital set up, administration and functioning. Methods of record keeping. Retrieval, processing, analysis and interpretation of data. Hospital management involving out patient department (OPD), Indoor patient, Critical care/ intensive care unit, sanitation, up keeping, practice management etc. Doctor client interaction: Orientation to local language/dialect/ local terminology of the diseases. Registration, filling up registration cards, history taking. Relating generic and trade names of drugs along with their doses, indications and contraindications to prescribed treatment regimens. Familiarization and practice of first aid procedures and emergency medicine. Practice of collection, labeling, packaging and evaluation of laboratory samples. Clinical practice comprising of clinical examination of the patient, with emphasis on history taking, examination techniques- palpation, percussion and auscultation, systematic examination of various systems, recording of clinical observations viz. temperature, respiration, pulse, cardiac sounds, cardiac function, pulmonary function, functional motility of digestive system, routes and techniques of administration of medicaments. Diagnosis and treatment of common clinical cases like pharyngitis, laryngitis, stomatitis, indigestion, ruminal impaction, tympany, enteritis, traumatic reticulo-peritonitis, traumatic pericarditis, pneumonia, haemoglobinurea. haematuria. milk fever, ketosis, rickets, osteomalacia, common poisoning, and others. Collection of materials like urine, faeces, skin scraping, blood, milk and other body fluids for laboratory tests. Preparation of case records; follow-up records etc. Treatment of causalities and other emergencies. Screening of livestock/poultry through tests, mass diagnostic campaigns. Vaccination and other disease prevention and control programmes in the field. Practice of feeding of sick animals. Acts and regulations pertaining to generation and disposal of biomedical wastes in veterinary institutions.
Biomedical waste generation, handling, storage, sorting, coding, transportation and disposal. Hazards of biomedical waste, and impact of biomedical waste on the environment.

4. Gynecology and Obstetrics Section:

5. Surgery and Radiology Section:

Note: The skills required for the Comprehensive Examination of Core Competence to be held for the purpose of assessment/evaluation of Internship shall be imparted under these courses.

**SEMESTER VII**

**B. VETERINARY CLINICAL BIOCHEMISTRY AND LABORATORY**

**DIAGNOSIS – I (Jointly with VPB and VPP)**

1. VLD-411 : Credit Hours 0+1 = 1

Training in examining clinical samples (biochemical, pathological, parasitological and bacteriological). Analysing and correlating with clinical findings and interpreting the results. Collection, labeling, transportation, and preservation of body fluid samples. Writing results and report. Interpretation of data in relation to specific diseases. Clinical significance and interpretation of serum glucose, lipids, proteins, blood urea nitrogen, creatinine, uric acid, ketone bodies, bilirubin & electrolytes from samples. Clinical significance and interpretation of examination of urine samples.
Clinical evaluation of blood (Haemoglobin, packed cell volume, total erythrocytic count, erythrocytic sedimentation rate, total leukocytic count and differential leucocytic count) from clinical samples. Laboratory evaluation and diagnosis of samples for parasitic diseases (routine faecal examinations- direct smear method, simple sedimentation and floatation methods, Quantitative faecal examination, pastural larval counts). Examination of skin scrapings, examination of blood smear/blood for diagnosis of blood protozoan diseases.

**SEMESTER VIII**

**B. VETERINARY CLINICAL BIOCHEMISTRY AND LABORATORY DIAGNOSIS – II (Jointly with VPB, VPP, VMC and VPT)**

2. VLD-421 : Credit Hours 0+1=1


Preparation of microscopic slides from tissue collected for diagnosis and its' histopathological interpretation. Examination of biopsy and morbid material for laboratory diagnosis, Orientation to a clinical Microbiology laboratory, Collection, transport and processing of specimens from clinical cases for diagnosis of important bacterial, fungal and viral diseases. Isolation of bacteria from clinical samples, Identification of bacteria by Grams staining and cultural/ biochemical characteristics. Drug sensitivity and rationale for therapy. Diagnosis of diseases by employing tests like Agar Gel precipitation Test Enzyme linked immunosorbent assay. Dot immunoassay, tube agglutination test, slide agglutination tests etc.

Practice for separation of toxic materials from samples. Detection of arsenic, lead, antimony, mercury, copper, zinc, fluorides. Nitrates/nitrites cyanides and tannins in body fluids/tissues of animals. Evaluation of samples of toxic residues. Appreciation and differentiation of symptoms caused by various types of toxic materials including agrochemicals plants and drugs.

**SEMESTER VIII**

**C. VETERINARIAN IN SOCIETY**

TVC-421 Non-Credit Course: 1 +0=1


Professional development. Societal responsibilities of veterinarians. Societal responsibilities with respect to Private and Public Hospital and practice management.

Social conduct and personality profiles in management of clinical practice. Veterinary professional interactions with Health Authorities, Drug and Food Regulatory Authorities, Zoo/Animal Welfare organisations and Civil Administration. Role of Veterinarian in Natural Calamities and Disaster Management.
INSTRUCTIONAL LIVESTOCK FARM COMPLEX

SEMESTER III

Course Title : Livestock Farm Practices
Course No. : LFP-211
Credit hours : 0+1=1

I. SYLLABUS

PRACTICAL

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.

SEMESTER IV

Course Title : Livestock Farm Practices
Course No. : LFP-221
Credit hours : 0+1=1

I. SYLLABUS

PRACTICAL

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.