

VETERINARY PHYSIOLOGY

Course Structure - at a Glance

CODE	COURSE TITLE	CREDITS
VPY 601	PHYSIOLOGY OF DIGESTION	2+1
VPY 602	CARDIOVASCULAR AND RESPIRATORY PHYSIOLOGY	2+1
VPY 603	RENAL PHYSIOLOGY AND BODY FLUID DYNAMICS	2+1
VPY 604	HAEMATOLOGY	2+1
VPY 605	VITAMINS AND MINERALS IN ANIMAL PHYSIOLOGY	2+0
VPY 606	PHYSIOLOGY OF ANIMAL REPRODUCTION	2+1
VPY 607	CLINICAL PHYSIOLOGY	2+1
VPY 608	NEUROMUSCULAR PHYSIOLOGY	2+1
VPY 609	CHEMICAL BIOREGULATION IN PHYSIOLOGICAL FUNCTIONS	3+0
VPY 610	RESEARCH TECHNIQUES IN VETERINARY PHYSIOLOGY	0+2
VPY 691	MASTER'S SEMINAR	1+0
VPY 699	MASTER'S RESEARCH	20
VPY 701	APPLIED PHYSIOLOGY OF BODY FLUIDS AND ELECTROLYTES	2+1
VPY 702	PHYSIOLOGY OF ANIMAL BEHAVIOUR	2+0
VPY 703	COMPARATIVE PHYSIOLOGY OF RUMINANT DIGESTION	2+1
VPY 704	ADVANCES IN NEURO-ENDOCRINOLOGY	2+1
VPY 705	MYOPHYSIOLOGY AND KINESIOLOGY	2+1
VPY 706	AVIAN PHYSIOLOGY	2+1
VPY 707	PHYSIOLOGY OF LACTATION	2+1
VPY 708	ADVANCES IN ENVIRONMENTAL PHYSIOLOGY AND GROWTH	2+1
VPY 709	ADVANCES IN RUMEN MICROBIOLOGY AND METABOLISM	2+1
VPY 710	ADVANCES IN IMMUNOPHYSIOLOGY	2+1
VPY 711	PHYSIOLOGY OF STRESS	2+1
VPY 790	SPECIAL PROBLEM	0+2
VPY 791	DOCTORAL RESEARCH I	1+0
VPY 792	DOCTORAL RESEARCH II	1+0
VPY 799	DOCTORAL RESEARCH	45

VPY 601: PHYSIOLOGY OF DIGESTION**2+1**

Objective: To teach comparative physiology of digestive system of monogastric animals, ruminants and birds, and basic techniques.

Theory**UNIT I**

Basic characteristics and comparative physiology of digestive system of domestic animals.

UNIT II

Gastro-intestinal motility, secretory functions of gastro-intestinal tract, their regulation and gastro-intestinal hormones.

UNIT III

Absorption, metabolism and excretion of various nutrients, appetite and control of feed intake.

UNIT IV

Development of ruminant system and rumen environment. Ruminant microbial digestion, its advantages and disadvantages. Rumino-reticular motility, its significance and control.

UNIT V

Rumen microbiology. Digestion in birds.

Practical

Collection of saliva and its enzymatic studies. Activity of pepsin and trypsin enzymes. Gastric and intestinal motility. Estimation of digestive metabolites such as glucose, ketone bodies, triglycerides, cholesterol, urea-nitrogen and total proteins. Liver function tests. Method of collection of rumen liquor, merits and demerits. Determination of pH, total volatile fatty acids, ammonia-nitrogen and total-nitrogen in strained rumen liquor. Rate of passage of digesta and its estimation. Rumino-reticular movements. Artificial rumen, counting of protozoa and bacteria.

Suggested Readings

Cunningham JG. 1992. *Text book of Veterinary Physiology*. WB Saunders.

Swenson MJ & Reece WO. 2005. *Duke's Physiology of Domestic Animals*. Panima.

D.C. Church. (1988) *Digestive Physiology & Nutrition of Ruminants*. Praeice Hall.

Hungate R.E. 1966. *Rumen and its Microbes*. Acad. Press.

N.Y. Forbes JM. & France J. 1993. *Quantitative aspects of Ruminant Digestion & Metabolism*. CAB International. Cambridge. UK

VPY 602: CARDIOVASCULAR AND RESPIRATORY PHYSIOLOGY**2+1**

Objective: To teach function and regulation of heart, recording of ECG and respiration in different animals and basic techniques.

Theory**UNIT I**

Heart muscle, heart as pump, origin and propagation of heart beat. Electrophysiology of heart, rhythmic excitation of heart, cardiac cycle, heart sound and dynamics of valvular and congenital heart defect.

UNIT II

Cardiac output and its measurements, factors affecting cardiac output. Venous return and its regulation. Control of the heart.

UNIT III

Normal electro-cardiogram, electrocardiographic interpretation in cardiac myopathies and cardiac arrhythmias.

UNIT IV

Circulation and hemodynamics, coronary, systemic and pulmonary circulation, their regulation, energetics of circulation, pathophysiology of circulation.

UNIT V

Respiration, mechanism of ventilation, hemoglobin, oxygen and carbon-dioxide transport. Respiratory gas exchange. Respiratory adjustment at high altitude and deep swimming. Neural and chemical control of respiration, artificial respiration. Respiration in birds.

Practical

Determination and recording of cardiac output, blood pressure and electrocardiogram, blood volume. Estimation of lung volumes and capacities by spirometry, effect of various levels of exercise on lung functional capacities. Estimation of blood gases.

Suggested Readings

Cunningham JG. 1992. *Text book of Veterinary Physiology*.

WB Saunders. Swenson MJ & Reece WO. 2005. *Duke's Physiology of Domestic Animals*.

Panima.Patton 1989. *Howell's Text book of Physiology*. WB.

Saunders. Ganong FW. 2003. *Review of Medical Physiology*. Prentice-Hall.

VPY 603: RENAL PHYSIOLOGY AND BODY FLUID DYNAMICS

2+1

Objective: To impart knowledge regarding excretory system of mammals and birds, maintenance of body fluid homeostasis.

Theory

UNIT I

An overview of nephron structure and function. Renal homeostatic function and renal excretory function.

UNIT II

Quantitative analysis of renal function, renal haemodynamics. Glomerular filtration- its mechanism and measurement. Permeability of the glomerular capillary wall, structural basis of GFR, tubular reabsorption and transport.

UNIT III

Role of kidney in acid-base balance. Physiology of micturition, endocrine control of renal function. Non excretory functions of kidney.

UNIT IV

Skin- general anatomy of epidermis, dermis, hypodermis, mechanical protection, permeability, actinic irradiation, sweat glands, sebaceous glands. Skin grafting. Immune properties of skin.

UNIT V

Composition of body fluids and their regulation. Excretory system in birds.

Practical

Collection and preservation of urine. Physical and chemical analysis of urine and its interpretation in health and disease condition. Demonstration of various kidney function tests, glomerular filtration rate, creatinine clearance rate, urea clearance rate and glucose tolerance test.

Suggested Readings

Klahar S. 1983. *The Kidney and Body Fluids in Health and Diseases*. Plenum Press.

Swenson MJ & Reece WO. 2005. *Duke's Physiology of Domestic Animals*. Panima.

VPY 604: HAEMATOLOGY**2+1**

Objective: To acquaint the students about haematology of different animals including hands-on training.

Theory**UNIT I**

Red blood cells, anaemia, different types of anaemia, polycythemia and their effect on circulation in mammals and birds.

UNIT II

Resistance of the body to infection, leukocytes, tissue macrophage system and inflammation.

UNIT III

Immunity, immunoglobulins, immunogenetics, polymorphism in hemoglobin, transferrin etc. Changes in blood during diseases. Iatrogenic blood diseases, hemorrhagic diathesis, hemophilias.

UNIT IV

Hemostasis and coagulation factors, role of platelets, fibrinolysis. Blood groups, transfusion of blood. Tissue and organ transplantation. Conditions causing bleeding disorders.

Practical

Haemograms, platelet count, erythrocyte fragility. Estimation of serum iron and iron binding capacities of plasma. Separation of variants of hemoglobin and transferrin by electrophoresis. Examination of bone marrow. Isolation of different types of blood cells by sedimentation and column chromatography.

Suggested Readings

Dacie JV & Lewis SM. 1991. *Practical Hematology*. Churchill Livingstone. Jain NC. 1993. *Essentials of Veterinary Hematology*. Lea & Febiger. Rapaport SI. 1987. *Introduction to Hematology*. JB Lippincott.

VPY 605: VITAMINS AND MINERALS IN ANIMAL PHYSIOLOGY**2+0**

Objective: To teach the importance of these nutrients in normal body functions and in disease conditions.

Theory**UNIT I**

Introduction and brief history, definition, general properties and overview of functions.

UNIT II

Fat soluble vitamins, their functions and deficiency diseases.

Water soluble vitamins and vitamin-like compounds, their functions and deficiency diseases.

UNIT IV

Physiological functions of trace elements, their role in metabolism, toxicity, deficiency diseases.

Suggested Readings

McDowell LR. 1989. *Vitamins in Animal Nutrition*. Academic Press.

Underwood EJ. 1977. *Trace Elements in Human and Animal Nutrition*. Academic Press.

VPY 606: PHYSIOLOGY OF ANIMAL REPRODUCTION**2+1**

Objective: To impart knowledge of male and female reproductive system of different species of animals including birds.

Theory**UNIT I**

Functional histomorphology of male and female reproductive system, development of male and female sex organs. Endocrine and neuroendocrine relation in male and female reproductive function in different domestic animals.

UNIT II

Sexual cycles and mating behaviours in females, oogenesis, folliculogenesis and ovulation. Secretions of female reproductive tract in different species of animals.

UNIT III

Male mating behaviour, spermatogenesis, spermiogenesis, Seminiferous, epithelial cycles. Spermatozoa- structure and composition, maturation and transportation. Secretions of male reproductive tract.

UNIT IV

Transport of male and female gametes, fertilization, implantation. Pregnancy and parturition. Post-partum recovery in different species of domestic animals.

Practical

Heat detection in different animals, palpation of reproductive organs. Physical and biochemical evaluation of semen, determination of sperm enzyme, leakage during freezing. Preservation of semen, RIA of steroid hormones.

Suggested Readings

Hafeez ESE. 2000. *Reproduction in Farm Animals*.

Lippincott, Williams & Wilkins. Pineda & Doley 2003. *McDonald's Veterinary Endocrinology*. Iowa State University Press, Ames.

Salisbury GW & Demark NL. 1978. *Physiology of Reproduction and Artificial Insemination*.

WB Saunders. Swenson MJ & Reece WO. 2005. *Duke's Physiology of Domestic Animals*. Panima.

VPY 607: CLINICAL PHYSIOLOGY**2+1****Objective:****UNIT I**

To teach physiological basis of clinical abnormalities in body functions. Cardiovascular, respiratory, hepatic and renal evaluation of body functions in relation to clinical conditions.

UNIT II

Carbohydrate, fat, protein and mineral metabolism in health and disease of various species.

UNIT III

Functions and dysfunctions of liver, kidney and gastro-intestinal tract.

UNIT IV

Clinico-immunological evaluation of immune responses and clinical enzymology.

Practical

Qualitative tests for glucose, ketone bodies, protein and calcium in urine. Quantitative determination of glucose in blood and urine. Electrophoresis of plasma proteins. Determination of sodium and potassium in serum. Determination of serum chloride. Separation of amino acids. Thin-layer chromatography of serum lipids.

Suggested Readings

Henry RJ. 1974. *Clinical Chemistry. Principles and Techniques*. Harper D Row Publishers.

Kaneko JJ, Harvey JW & Bruss ML. 1997. *Clinical Biochemistry of Domestic Animals*. Academic Press.

King EJ & Wooton IDP. 1956. *Microanalysis in Medical Biochemistry*. Churchill Livingstone.

Oser BL. 1976. *Hawk's Physiological Chemistry*. Tata McGraw-Hill.

Rose BD. 1989. *Clinical Physiology of Acid Base and Electrolyte Disorders*. McGraw-Hill.

Tietz NW. 1970. *Fundamentals of Clinical Chemistry*. WB. Saunders.

VPY 608: NEUROMUSCULAR PHYSIOLOGY

2+1

Objective: To impart knowledge of coordination of body functions and regulation of brain functions and sense organs.

Theory

UNIT I

Types and classification of muscles, comparative histopathology of muscles. Skeletal muscle fibers, membrane and action potential at myoneuronal junction. Molecular characteristics of contractile filaments, molecular mechanism of muscle contraction, relationship between actin and myosin filaments, overlap and tension developed by the contracting muscles. Contractile process of smooth muscles.

UNIT II

Length and tension relationship, force and velocity relationship. Skeletal muscle energetics, metabolism and lactate shuttle. Exercise, adaptation to training and performance. Neuromuscular disorders of domestic animals.

UNIT III

Nervous system, synapse, transmission and processing of information, receptors, brain and spinal reflexes, motor functions of brain stem, limbic system, memory, sleep, learning, autonomic nervous system.

Special senses and somatic senses.

Practical

Recording of electro-myogram, fatigue, tetanus in muscles. Effect of temperature on different types of muscles, demonstration of intestinal movements, effect of drugs on all types of muscles, estimation of muscles specific enzymes.

Suggested Readings

Basmajian JV. 1978. *Muscle Alive: their Functions Revealed by*

Electromyography. Williams & Wilkins. Cooper R. 1980. *EEG Technology*. Butterworths, London. Klemm. WR. 1969. *Animal Electroencephalography*. Acad. Press Inc. New

York.

Smith R.F. 1978. *Fundamentals of Neurophysiology*. Springer Verlag.

Swenson MJ & Reece WO. 2005. *Duke's Physiology of Domestic Animals*. Panima.

VPY 609: CHEMICAL BIOREGULATION IN PHYSIOLOGICAL FUNCTIONS**3+0**

Objective: To acquaint the students about different endocrine glands of the body and their relationship with production.

Theory**UNIT I**

Methods of study bioregulation including methods of endocrine analysis. Manipulation and disruption of biorhythms in homeostatic and natural ecosystem.

UNIT II

Hormonal relationship in animal production. Concepts in hormone function, classification and methods of study. Hormonal assay, mechanism of hormone synthesis, release and transport. Mechanisms of hormone action, target cell interactions.

UNIT III

Genetic and genomic approaches in endocrinology. Animal models and alternate uses of animal model. Regulation and metabolism of hypothalamic, hypophyseal, thyroid and adrenal hormones.

UNIT IV

Gonadal and placental hormones, their regulation and mechanism of action. Hormonal principles of pineal gland and its role in production.

UNIT V

Endocrine control of carbohydrate and calcium homeostasis. Hormones and adaptation to environment. Hormonal regulation of gastro-intestinal activity. Prostaglandins. Hormones in fertility regulation and production augmentation. Avian endocrinology.

Suggested Readings

Pineda MH & Doley MP. 2003. *McDonald's Veterinary Endocrinology*. Blackwell Publ.

Turner CD & Bagnara JT. 1976. *General Endocrinology*. WB Saunders. Williams RH. 1982. *Text Book of Endocrinology*. WB Saunders.

VPY 610: RESEARCH TECHNIQUES IN VETERINARY PHYSIOLOGY**0+2**

Objective: Training in various techniques for application in research in Animal Physiology.

Practical

Recording of ECG, EMG, blood pressure, pulse rate, movement of GI tract by Physiograph. Gas Liquid Chromatography. Electrophoresis. Estimation of various electrolytes. Estimation of bacterial production rate and VFA production rate, solid and liquid digesta flow rates and body composition using radio-isotopes, *in vitro* and *in sacco* rumen studies, ELISA. R.I. A. techniques of various hormones.

Suggested Readings

Abraham GE. 1977. *Handbook of Radioimmunoassay*.

Marcel Dekker. Armstrong ML. 1978. *Electrocardiograms: A Systematic Method of Reading Them*.

KM Verghese. Oser BL. 1976. *Hawk's Physiological Chemistry*. Tata McGraw-Hill.

Smorto MP & Basmajian JV. 1979. *Clinical Electroneurography – An Introduction to Nerve Conduction Tests*. Williams & Wilkins.

Objective: To teach physiological and clinical implication of changes in electrolytes and body fluids.

Theory

UNIT I

Volume and composition of body fluids, exchange of water and electrolytes between body compartments, blood and external environment. Osmolarity of fluid.

UNIT II

Regulation of volume and osmolarity of extra cellular fluid. Regulation of pH and acid base balance. Formation and composition of cerebrospinal fluid and lymph.

UNIT III

Clinical implications of change in electrolytes and body fluids. Structural and functional consideration of plasma and its composition. Diuresis and endocrine control of renal functions.

UNIT IV

Clinical feature in fluid and electrolyte imbalance, clinicopathological indicators of fluid and electrolytes imbalance.

Practical

Determination of electrolytes viz. sodium, potassium and chloride in plasma, determination of total body water and plasma volume by various techniques i.e. dye dilution and radioisotope technique, Estimation of osmolarity and osmolality of body fluids.

Suggested Readings

Selected articles from journals.

VPY 702: PHYSIOLOGY OF ANIMAL BEHAVIOUR

2+0

Objective: To impart knowledge on various aspects of animal behaviour viz. communication in animals, sexual behaviour, feeding behaviour etc.

Theory

UNIT I

Introduction to animal ethology. Neurophysiological basis of animal behaviour.

UNIT II

Behaviour in relation to changes in the environment. Feeding behaviour, grazing, stall feeding and rumination.

UNIT III

Sexual behaviour in the female and male. Maternal behaviour. Milk let down.

UNIT IV

Social behaviour, communication in animals, animal temperament. Response of dogs and horses to training.

Suggested Readings

Selected articles from journals.

VPY 703: COMPARATIVE PHYSIOLOGY OF RUMINANT DIGESTION**2+1**

Objective: To teach functional development of rumen and comparative digestive functions in different ruminant species.

Theory**UNIT I**

Functional development of ruminant stomach. Rumen motility and its control.

UNIT II

Salivary secretion and its regulation. Intraruminal environment, rumen metabolites and their assimilation, NPN feeding, nitrogen recycling.

UNIT III

Synthesis of microbial proteins and vitamins. Rumen dysfunctions. Comparative efficiency of rumen function in different species. Stoichiometry of carbohydrate fermentation.

UNIT IV

Manipulation of rumen fermentation, protected nutrients feeding, probiotics supplementation etc. Rumen flow rate and rumen volume.

Practical

Reticulo-ruminal motility, artificial rumen techniques, total volatile fatty acids and their fractions, bacteria, protozoa and fungi in rumen. Flow rates of ruminal contents.

Suggested Readings

Selected articles from journals.

VPY 704: ADVANCES IN NEURO-ENDOCRINOLOGY**2+1**

Objective: To acquaint the students about neuro-endocrine integrating mechanism in animals and birds.

UNIT I

Neuroendocrine integrating mechanism. Structure of hypothalamus, pituitary gland, limbic and other neural pathways and endocrine functions.

UNIT II

Neural control of oxytocin, adrenocorticotrophic hormone, aldosterone, thyrotrophic hormone, growth hormone, gonadotrophins etc. Hypothalamic releasing factors and the neuro-vascular link between brain and anterior pituitary.

UNIT III

Role of afferent impulses from genitals and other regions in reproductive system. Influence of hormones on brain activity.

UNIT IV

Effects of drugs on neuro-endocrine system. Neuro-endocrine mechanisms in birds. Interaction of nervous, endocrine and immune system in animal production and reproduction.

Practical

Radio-immuno assay of progesterone, effects of ovariectomy, effects of testosterone treatment. Bioassay of estrogens. Estimation of T₃ and T₄ in blood.

Suggested Readings

Selected articles from journals.

VPY 705: MYOPHYSIOLOGY AND KINESIOLOGY**2+1**

Objective: To impart the knowledge regarding exercise and work physiology, molecular basis of muscle contraction.

Theory**UNIT I**

Structure of muscle, chemical composition, muscle contraction and irritability. Mechanical properties of skeletal muscle.

UNIT II

Thermal properties of muscles. Chemical correlates of contraction.

UNIT III

Molecular basis of muscular contraction of skeletal muscle. Pathophysiology of muscles and myocardium.

UNIT IV

Lever systems of body joints, Synovial fluid formation and its physiology. Principles of Kinesiology and its application in work physiology.

Practical

Electromyogram, Tetany. Electro-cardiogram. Intestinal movements. Effects of various drugs on all types of muscles.

Suggested Readings

Selected articles from journals.

VPY 706: AVIAN PHYSIOLOGY**2+1**

Objective: To impart complete knowledge about physiology of domestic fowl and comparative physiology of other birds.

UNIT I

Digestive and urinary system.

UNIT II

Blood, cardiovascular and respiratory system.

UNIT III

Reproductive and endocrine system.

UNIT IV

Nervous system and musculo-skeletal system.

Practical

Study of blood cells, haemoglobin, packed cell volume (haematocrit) and erythrocyte sedimentation rate. Determination of glucose, calcium, uric acid and urea in blood. Electrophoretic separation of plasma proteins and egg proteins.

Suggested Readings

Selected articles from journals.

VPY 707: PHYSIOLOGY OF LACTATION**2+1**

Objective :To acquaint students with physiology and mechanism of lactation.

Theory**UNIT I**

Functional anatomy, histology and cytology of mammary gland in domestic animals.

UNIT II

Development of mammary gland, hormonal control of mammary gland growth.

UNIT III

Process of lactation, initiation of milk secretion, hormonal control of lactation. Biochemical and histological changes in mammary gland during lactation. Mechanism of galactopoiesis.

UNIT IV

Neural control of lactation, milk let down, milk ejection and inhibition of milk ejection. Induced lactation. Composition of milk in different species of animals.

Practical

Examination of normal udder of cow and buffalo. Composition of colostrum and milk during different phases of lactation. Effect of adrenalin and oxytocin on milk let down, artificial induction of lactation. Estimation of lactogenic hormones.

Suggested Readings

Selected articles from journals.

VPY 708: ADVANCES IN ENVIRONMENTAL PHYSIOLOGY AND GROWTH**2+1**

Objective :To acquaint the students about co-relation of various environmental factors on growth and performance of animals.

UNIT I

Ecology of farm animals, biological rhythms, mammalian circadian rhythms, their regulation. Components of physical environment, biometeorology and principles of thermoregulation in mammals and birds.

UNIT II

Physiological response of farm animals to heat and cold. Effect of various climatic components on health and production (growth and egg production), reproduction and climatic adaptation.

UNIT III

Concept and definitions of cellular, prenatal and postnatal growth- patterns in different species of domestic animals.

UNIT IV

Factors affecting live weight growth viz. nutrition, hormones, vitamins, antibiotics, environment. Ageing and senescence. Growth anomalies.

Practical

Growth measurement and growth curves, recording of various climatic variables, effect of climatic variables on growth and production.

Suggested Readings

Selected articles from journals.

VPY 709: ADVANCES IN RUMEN MICROBIOLOGY AND METABOLISM**2+1**

Objective: Students will learn about rumen ecosystem and symbiotic relationship of flora and fauna, their structure and functions. Rumen manipulation techniques.

Theory**UNIT I**

Introduction to rumen bacteria, protozoa and fungi. Development and natural fluctuation in rumen microbial population.

UNIT II

Microbial ecology and physiology of feed degradation within the rumen. Metabolism of nitrogen containing compounds.

UNIT III

Degradation of carbohydrate, fat and protein by rumen microbes, NPN utilization, Microbe-microbe interaction. Protected nutrients and other feed additives.

UNIT IV

Genetics and biotechnology of rumen microbes, rumen anaerobic fungi, their role and interaction with other rumen microbes.

Practical

Counting of total and differential protozoa, total and viable bacteria and fungi in rumen liquor. Individual VFA by GLC. Defaunation and manipulation of rumen fermentation. Culture of bacteria and fungi.

Suggested Readings

Selected articles from journals.

VPY 710: ADVANCES IN IMMUNOPHYSIOLOGY**2+1**

Objective :To study cells and organs of immune system, its development and role in physiological functions and immunomodulation.

Theory**UNIT I**

Introduction, history, body defense, organs of immune system, ontogeny and phylogeny of immune system, vertical transmission of immunity and difference between vertebrates and invertebrates

UNIT II

Immunoglobulins-basic structure and functions, hematopoiesis, T-cell and B-cell-evolution, development and their functions, species specific immunity, cytokines-sources and actions, MHC, genetic organization of immunoglobulin, MHC and complement system.

UNIT III

Immune-endocrine interactions, immune system in reproduction, ageing, stress and other physiological functions, immunomodulation.

UNIT IV

Hypersensitivity, diseases related to immune system, dysfunction, autoimmune disorders and their genesis, immunodeficiency.

Practical

Qualitative & quantitative analysis of immunoglobulins in body fluids, RIA, ELISA, Electrophoresis techniques in immunophysiology, raising hyperimmune sera and blood group immunophysiology.

Suggested Readings

Abbas AK, Lichtman AH & Pillai S. (Eds). 2007. *Cellular and Molecular Immunology*. 6th Ed. Elsevier.

Goldsby RA, Kindt TJ, Osborne PA & Kuby J. 2007. *Immunology*. 6th Ed. WH. Freeman.

Roitt IM. 1997. *Essential Immunology*. 9th Ed. Blackwell, Oxford.

Tizzard IR. 2004. *Veterinary Immunology*. 5th Ed. WB. Saunders.

VPY 711: PHYSIOLOGY OF STRESS

2+1

Objective :To teach the mechanism and effect of stress on production and reproduction in domestic animals.

Theory

UNIT I

Definition of stress, various types of stresses, their effect on animal production and reproduction.

UNIT II

Physico-chemical changes of blood composition due to exercise and work. Energy utilization and requirement of muscles during work and exercise.

UNIT III

Capacity of work under field and controlled laboratory conditions, factors that regulate it.

UNIT IV

Effect of various stresses on endocrine status of animals, endurance in animals.

Practical

Measurement of various biochemical parameters during stress and /or exercise in animals, measurement of various hormones during different stresses in animals, measurement of cardio-respiratory reactions during stresses.

Suggested Readings :Selected articles from journals.

VPY 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.