VETERINARY PARASITOLOGY

Course Structure

COURSE NO.	COURSE TITLE	CREDITS	SEM
VPA 601	VETERINARY HELMINTHOLOGY - I	2+1	I
VPA 602	VETERINARY HELMINTHOLOGY - II	2+1	II
VPA 603	VETERINARY ENTOMOLOGY AND ACAROLOGY	2+1	I
VPA 604	VETERINARY PROTOZOOLOGY	2+1	II
VPA 605	PARASITOLOGICAL TECHNIQUES	0+2	I
VPA 606	CLINICAL PARASITOLOGY	1+1	I
VPA 607	TRENDS IN CONTROL OF LIVESTOCK AND POULTRY PARASITES	1+1	II
VPA 608	IMMUNOPARASITOLOGY	2+1	I
VPA 609	PARASITIC ZOONOSES	2+0	II
VPA 610	PARASITES OF ZOO AND WILD ANIMALS	2+1	II
VPA 611	MALACOLOGY	1+1	I
VPA 691	MASTER'S SEMINAR	1	I, II
VPA 699	MASTER'S RESEARCH	20	I, II
VPA 701	APPLICATIONS OF REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM IN PARASITOLOGY	1+2	I
VPA 702	MOLECULAR DIAGNOSTICS AND VACCINE DEVELOPMENT IN PARASITOLOGY	2+1	II
VPA 703	HOST PARASITE INTERACTIONS	2+0	I
VPA 704	ADVANCES IN PROTOZOOLOGY	2+1	II
VPA 705	ADVANCES IN HELMINTHOLOGY - I	2+1	I
VPA 706	ADVANCES IN HELMINTHOLOGY - II	2+1	II
VPA 707	ADVANCES IN ENTOMOLOGY AND ACAROLOGY	2+1	I
VPA 708	*IN VITRO* CULTIVATION OF PARASITES	1+2	II
VPA 709	EMERGING AND RE-EMERGING PARASITIC DISEASES	2+0	II
VPA 710	BIONOMICS OF PARASITES	3+0	I
VPA 711	ENVIRONMENTAL PARASITOLOGY	1+1	I
VPA 790	SPECIAL PROBLEM	0+2	I, II
VPA 791	DOCTORAL SEMINAR I	1	I, II
VPA 792	DOCTORAL SEMINAR II	1	I, II
VPA 799	DOCTORAL RESEARCH	45	I, II

VETERINARY PARASITOLOGY

Course Contents

VPA 601 VETERINARY HELMINTHOLOGY – I 2+1 SEM - I

Objective

To learn about various aspects of trematode and cestode parasites of veterinary importance.

Theory

UNIT-I: Introduction, history, classification, general account and economic importance of platyhelminths.

UNIT-II: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Dicrocoeliidae, Opisthorchiidae, Strigeidae and Fasciolidae.

UNIT-III: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Echinostomatidae, Heterophyidae, Plagiorchiidae, Troglotrematidae, Prosthogonimidae, Nanophyetidae and Paragonimidae.

UNIT-IV: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Notocotylidae, Brachylemidae, Cyclocoelidae, Paramphistomatidae and Schistosomatidae.

UNIT-V: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to families: Mesocestoididae, Anoplocephalidae, Thysanosomidae, Dipylidiidae and Dilepididae.

UNIT-VI: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to families: Davaineidae, Hymenolepididae, Taeniidae and Diphyllobothriidae.

Practical

Identification of trematode and cestode parasites; their eggs and intermediate hosts. Observation on parasitic stages in host tissues and associated pathological lesions.

Suggested Readings

Chowdhury N. and Toda I. 1994. *Helminthology*. Spinger Verlag, Narosa Publishing House.

Dalton JP. 1999. *Fasciolosis*. CABI.

Gibson DI. 2002. *Keys to the Trematoda*, Vol.I. CABI.

Khalil LF, Jones A & Bray RA. 1994. *Keys to the Cestode Parasites of Vertebrates*. CABI.

Kumar V. 1998. *Trematode Infections and Diseases of Man and Animals*. Kluwer Academic Publishers.

Lapage G. 2000. *Monning's Veterinary Helminthology and Entomology*. Greenworld Publ.

Mehlhorn H. 1988. *Parasitology in Focus: Facts and Trends*. Springer Verlag.

Singh G & Prabhakar S. 2002. *Taenia solium Cysticercosis*.CABI

Sood ML. 2003. *Helminthology in India*. International Book Distributors.

Soulsby EJL. 1982. *Helminths, Arthropods and Protozoa of Domesticated Animals*. Bailliere Tindal.

VPA 602 VETERINARY HELMINTHOLOGY – II 2+1 SEM - II

Objective

To learn about various aspects of nematodes, thorny-headed worms and leeches of veterinary importance.

Theory

UNIT-I: Introduction, history, classification, general account and economic importance of nematodes and thorny-headed worms.

UNIT-II: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Ascarididae, Anisakidae, Oxyuridae, Heterakidae and Subuluridae.

UNIT-III: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Rhabditidae, Strongyloididae and Strongylidae.

UNIT-IV: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Trichonematidae, Amidostomidae, Stephanuridae, Syngamidae and Ancylostomatidae.

UNIT-V: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Metastrongylidae, Protostrongylidae, Filaroididae, Trichostrongylidae, Ollulanidae, Crenosomatidae and Dictyocaulidae.

UNIT-VI: Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Spiruridae, Thelaziidae, Acuariidae, Tetrameridae, Physalopteridae, Gnathostomatidae, Filariidae, Setariidae, Onchocercidae and Dracunculidae.

UNIT-VII: Morphology,epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Trichinellidae, Trichuridae, Capillariidae, Dioctophymatidae, Polymorphidae, Oligacanthorhynchidae and Gnathobdellidae.

Practical

Identification of nematode parasites; their eggs and intermediate hosts, differentiation, study of their stages in the tissues and associated pathological lesions.

Suggested Readings

Andersen RC. 2000. *Nematode Parasites of Vertebrates, their Development and Transmission*. CABI.

Kennedy MW & Harnett W. 2001. *Parasitic Nematodes: Molecular Biology, Biochemistry and Immunology*. CABI.

Lapage G. 2000. *Monning's Veterinary Helminthology and Entomology*. Greenworld Publ.

Lee DL. 2002. *The Biology of Nematodes*. Taylor & Francis.

Soulsby EJL. 1982. *Helminths, Arthropods and Protozoa of Domesticated Animals*. Bailliere Tindal.

VPA 603 VETERINARY ENTOMOLOGY AND ACAROLOGY 2+1 SEM - I

Objective

To learn various aspects of arthropods of veterinary importance.

Theory

UNIT-I: Introduction, history, classification and economic importance.

UNIT-II: Distribution, life cycle, seasonal pattern, pathogenesis, economic significance and control of arthropods belonging to the families: Culicidae, Ceratopogonidae, Simuliidae and Psychodidae.

UNIT-III: Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Tabanidae, Gasterophilidae, Muscidae, and Glossinidae.

UNIT-IV: Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Oestridae, Sarcophagidae, Calliphoridae and Hippoboscidae.

UNIT-V: Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Pediculidae, Haematopinidae, Linognathidae, Menoponidae, Philopteridae and Trichodectidae.

UNIT-VI: Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Siphonapteridae, Cimicidae and Reduviidae.

UNIT-VII: Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Dermanyssidae. Argasidae and Ixodidae.

UNIT-VIII: Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Sarcoptidae, Psoroptidae, Demodicidae, Trombiculidae, Cytoditidae and Linguatulidae.

UNIT-IX: Strategic control measures of arthropods with special emphasis on improved versions of chemical, biological and immunological control and integrated pest management.

Practical

Collection, preservation, identification and differentiation of various arthropods and their developmental stages; associated pathological changes and lesions; skin scraping examination.

Suggested Readings

Gupta SK & Kumar R. 2003. *Manual of Veterinary Entomology and Acarology*. International Book Distr. Co.

Harwood RF & James MT. 1979. *Entomology in Human and Animal Health*. MacMillan.

Kettle DS. 1995. *Medical and Veterinary Entomology*. CABI.

Lehane M. 2005. *The Biology of Blood Sucking Insects*. 2nd Ed. Cambridge University Press.

Marquardt WC. 2000. *Parasitology and Vector Biology*. Academic Press.

Mullen G & Durben L. 2002 *Medical and Veterinary Entomology*. Academic Press.

Wall R & Shearer D. 1997. *Veterinary Entomology*. Chapman & Hall.

VPA 604 VETERINARY PROTOZOOLOGY 2+1 SEM - II

Objective

To project the importance and to impart detailed knowledge on various aspects of protozoan parasites.

Theory

UNIT-I: Introduction, history, classification, general account, economic importance of protozoan parasites.

UNIT-II: Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the families: Trypanosomatidae, Monocercomonadidae, Trichomonadidae, Hexamitidae and Endamoebidae.

UNIT-III: Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the families: Eimeriidae, Cryptosporidiidae and Sarcocystidae.

UNIT-IV: Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the families: Plasmodiidae, Babesiidae, Theileriidae, Haemogregarinidae and Balantidiidae.

UNIT-V: Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of Rickettsiales like *Anaplasma, Ehrlichia* and *Haemobartonella*.

Practical

Identification of protozoan parasites and observation on parasite stages in host tissues and the attendant pathological lesions. Diagnosis of protozoan parasites of veterinary importance.

Suggested Readings

Bhatia BB & Shah HL. 2000. *Protozoa and Protozoan Diseases of Domestic Livestock*. ICAR.

Bhatia BB. 2000. *Textbook of Veterinary Protozoology*. ICAR.

Dobbelaere DAE & McKeever D. 2002. *Theileria*. Springer Verlag.

Dubey JP & Beattie CP.1988. *Toxoplasmosis of Animals and Man*. CRC Press.

Dubey JP, Speer CA & Fayer R. 1989. *Sarcocystosis of Animals and Man*. CRC Press.

Dubey JP, Speer CA & Fayer R. 1990. *Cryptosporidiosis in Man and Animals*. CRC Press.

Kreier JP. 1991-95. *Parasitic Protozoa*. Ed. JR Baker. Academic Press.

Levine ND. 1985. *Veterinary Protozoology*. Iowa State Univ. Press.

Lindsay DS & Weiss LM. 2004. *Opportunistic Infections* :*Toxoplasma, Sarcocystis and Microsporidia*. Kluwer Academic Press.

Maudlin I. 2004. *The Trypanosomiases*. Oxford Univ. Press.

Sterling CR. and Adam RD. 2004. *The Pathogenic Enteric Protozoa*. Kluwer Academic Press.

Thompson A. 2003. *Cryptosporidium*. Elsevier.

VPA 605 PARASITOLOGICAL TECHNIQUES 0+2 SEM - I

Objective

To impart practical knowledge on various techniques used in veterinary parasitology.

Practical

Microscopy, micrometry, camera lucida drawings, micro- and digital photography.

Collection, processing and examination of faecal and blood samples; lymph node biopsies, skin scrapings and nasal washings from animals for parasitological findings. Quantitative faecal examination. Evaluation of the efficacy and resistance of drugs against parasites. Maintenance of tick and fly colonies in laboratory for experimental purposes and testing of drugs; tick dissection for vector potential. Collection of aquatic snails from field and their examination for the presence of different parasitic stages. Collection, fixation, staining, whole mounts and identification of parasites. Cryopreservation of parasites, culturing techniques for important parasites and pasture larval count, worm count and assessment of worm burden. Remote sensing (RS) and geographic information system (GIS) as tools for mapping parasitic diseases.

Suggested Readings

Chaudhri SS & Gupta SK. 2003. *Manual of General Veterinary Parasitology*. International Book Distr. Co.

Durr P & Gatrell A. 2004. *GIS and Spatial Analysis in Veterinary Science*. CABI.

Ministry of Aghriculture, Fisheries and Food (MAFF). 1986. *Manual of Veterinary Parasitological Laboratory Techniques*. 3rd Ed. Tech. Bull. 18, HMSO.

Rathore VS & Sengar YS. 2005. *Diagnostic Parasitology*. Pointer Publ.

VPA 606 CLINICAL PARASITOLOGY 1+1 SEM - I

Objective

Collection and examination of clinical material for parasitological investigations and study of clinical cases.

Theory

UNIT-I: History, clinical signs, gross and microscopic examination of secretions and excretions of clinical cases.

UNIT-II: Collection and dispatch of material to laboratory for diagnosis.

UNIT-III: Animal sub-inoculation tests; blood and biopsy smear examination; histopathology of affected organs.

Practical

Identification, observation of parasitic stages in host tissues, excretions, secretions and associated pathological lesions.

Suggested Readings

Faust EC, Russell PF & Jung RC. 1971. *Craig and Faust's Clinical Parasitology*. Lea & Febiger.

Sloss MW, Kemp RL & Zajac AM. 1994. *Veterinary Clinical Parasitology*. Indian Ed. International Book Distr. Co.

Soulsby EJL. 1965. *Textbook of Veterinary Clinical Parasitology*. Blackwell.

VPA 607 TRENDS IN CONTROL OF LIVESTOCK AND POULTRY PARASITES 1+1 SEM - II

Objective

To learn about integrated approach for the control of helminths, arthropods and protozoan parasites of veterinary importance.

Theory

UNIT-I: Conventional and novel methods of control of helminth – anthelmintics, their mode of action, characteristic of an ideal anthelmintic, anthelmintic resistance, spectrum of activity, delivery devices, integrated control method and immunological control Formulation of deworming schedule. Snail and other intermediate host control.

UNIT-II: Conventional and novel methods of control of protozoan parasites – antiprotozoan drugs, their mode of action, integrated control method and immunological control.

UNIT-III: Conventional and novel methods of control of insects – Insecticides / acaricides - methods of application, their mode of action, insecticide resistance , integrated control method and immunological control.

Practical

In vivo and *in vitro* detection of efficacy of and resistance to parasiticidal agents.

Suggested Readings

Kaufmann J. 1996. *Parasitic Infections of Domestic Animals*. Birkhauser Verlag.

Mehlhorn H (Ed). 2001. *Encyclopedic Reference of Parasitology: Diseases, Treatment, Therapy*. Springer Verlag.

VPA 608 IMMUNOPARASITOLOGY 2+1 SEM - I

Objective

To impart knowledge about the immunology, immunodiagnosis and immunoprophylaxis of ecto- and endoparasites of veterinary importance.

Theory

UNIT-I: Introduction, types of parasitic antigens and their characterization.

UNIT-II: Types of immunity in parasitic infections. Cellular and humoral immunity to parasites, hypersensitivity, regulation of the immune response.

UNIT-III: Evasion of immunity, immumomodulations and their uses.

UNIT-IV: Immune responses in helminths, arthropods and protozoa of veterinary importance.

UNIT-V: Immunodiagnostic tests and their techniques; application of biotechnological tools in the diagnosis and control of parasitic diseases.

UNIT-VI: Vaccines and vaccination against parasitic infections.

UNIT-VII: Genetic control of parasites.

Practical

Preparation of various antigens (somatic, secretory and excretory) and their fractionation and characterization; raising of antisera and demonstration of various immunodiagnostic methods for the diagnosis of parasitic infections.

Suggested Readings

Behnkey JM. 1990. *Parasites, Immunity and Pathology*. Taylor & Francis.

Boothroyd JC & Komuniecki R. 1995. *Molecular Approaches to Parasitology*. Wileyliss Publication, New York.

Cohen S & Sadun EH. 1976. *Immunology of Parasitic Infections*. Blackwell.

Cox FEG. 1993. *Modern Parasitology*. Blackwell.

Marr JJ, Nilsen TW & Komuniecki RW. 2003. *Molecular Medical Parasitology*. Elsevier.

Waklin D. 1996. *Immunity to Parasites*. Cambridge University Press.

VPA 609 PARASITIC ZOONOSES 2+0 SEM - II

Objective

To provide the students with an in-depth knowledge of occurrence and importance of parasitic zoonoses and how these parasites are diagnosed and controlled.

Theory

UNIT-I: Introduction to the concept of zoonotic infections, definitions, various classifications of zoonoses, host-parasite relationships, modes of infections, factors influencing prevalence of zoonoses.

UNIT-II: A detailed study of transmission, epidemiology, diagnosis and control of major protozoa of zoonotic importance.

UNIT-III: A detailed study of transmission, epidemiology, diagnosis and control of major helminths of zoonotic importance.

UNIT-IV: A detailed study of transmission, epidemiology, diagnosis and control of major arthropods of zoonotic importance.

Suggested Readings

Miyazaki 1991. *Helminthic Zoonoses*. International Medical Foundation of Japan.

Palmer SR, Soulsby EJL & Simpson DIH. 1998. *Zoonoses*. Oxford.

Parija SC. 1990. *Review of Parasitic Zoonoses*. AITBS Publ.

Rathore VS.2005. *Parasitic Zoonoses*. Pointer Publishers.

Shakespeare M. 2002. *Zoonoses*. Pharmaceutical Press. University Press.

VPA 610 PARASITES OF ZOO AND WILD ANIMALS 2+1 SEM - II

Objective

To learn about biological and control aspects of parasitic diseases of zoo and wild animals.

Theory

UNIT-I: A detailed study of major protozoa of zoo and wild animals with particular emphasis on morphological features, geographical distribution, epidemiology, diagnosis and management.

UNIT-II: A detailed study of major arthropod parasites of zoo and wild animals with particular emphasis on morphological features, geographical distribution, epidemiology, diagnosis and management.

UNIT-III: A detailed study of major helminth parasites of zoo and wild animals with

particular emphasis on morphological features, geographical distribution, epidemiology, diagnosis and management.

Practical

Methods for investigating parasitic diseases in wild animals. Collection of parasites at post-mortem. Identification and quantification of parasites. Visit to Zoo and Wild Life Parks/ Sanctuaries.

Suggested Readings

Chowdhury N & Alonso Aquirre A. 2001. *Helminths of Wild Life*. Oxford & IBH Publishing Co. Pvt. Ltd.

Friend M & Franson JC. 1999. *Field Manual of Wildlife Diseases: General Field Procedures and Diseases of Birds*. Free of charge at:www.nwhc.usgs.gov/publications/field_manual/field_manual_of_wildlife_ diseases.pdf

NBII Wildlife Diseases Information Node can be reached at: http://wildlifediseases.nbii.gov

Samual W, Pybus M & Kocan A. (Eds). 2001. *Parasitic Diseases of Wild Mammals*. Iowa State Univ. Press.

VPA 611 MALACOLOGY 1+1 SEM - I

Objective

To learn about the details of various snails involved in diseases transmission.

Theory

UNIT-I: Characters and classification of Mollusca.

UNIT-II: Occurrence, distribution, ecology, life history, morphology and control of vector snails belonging to families, Planorbidae, Lymnaeiidae, Thiridae, Amnicolidae, Helicidae, Succineidae and Zonitidae.

UNIT-III: Examination of vector molluscs for parasitic infections.

UNIT-IV: Haematology, internal defense mechanisms, parasite-induced pathology and molluscan tissue culture.

Practical

Collection and identification of vector molluscs, study of their shells and internal organs. Breeding, rearing and maintenance of vector molluscs in the laboratory. Examination of molluscs for various developmental stages of parasites.

Suggested Readings

Malek EA & Cheng TC. 1974. *Medical and Economic Malacology*. Academic Press.

Sturm CF, Pearce TA & Valdés A. 2006. *The Mollusks: A Guide to Their Study, Collection and Preservation*. American Malacological Society, Pittsburgh and Universal Publishers, Boca Raton.

VPA 701 APPLICATIONS OF REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM IN PARASITOLOGY 1+2 SEM - I

Objective

To study the emerging applications of Remote Sensing and Geographic Information System in parasitology.

Theory

UNIT-I: Basic principles of Remote Sensing, satellite and imagery sensor systems, spectral signatures, interpretation of satellite imagery, digital image processing.

UNIT-II: Fundamentals of GIS, raster data representation, vector data representation, GIS data management, data input, editing, analysis and modeling. GIS output as maps.

UNIT-III: Integration of RS and GIS. Applications of RS and GIS in parasitology, case studies related to vector and vector-borne parasitic diseases, soil transmitted helminths.

Practical

Understanding maps and map projections, maps as models. IRS data products, visual interpretation of image, Digital image processing, contrast enhancements, spatial filtering techniques, image transformations, image classification. Applications of Remote Sensing in parasitology. Components of GIS, creation of digital database in a GIS, GIS operations, data analysis and modeling. Case studies of applications of GIS in parasitology. Application of GIS in modeling the spatial and temporal spread of parasites. Global Positioning System (GPS), its applications and hands-on practice. Hands-on practice on

RS and GIS software's like ERDAS Imagine, ArcGIS, ILWIS etc. Internet as resource for RS data products.

Suggested Readings

Selected articles from journals

VPA 702 MOLECULAR DIAGNOSTICS AND VACCINE DEVELOPMENT IN PARASITOLOGY 2+1 SEM - II

Objective

To understand the molecular analysis of parasites for diagnosis, disease control, drug development and vaccine production.

Theory

UNIT-I: Introduction and parasite genomics.

UNIT-II: DNA and RNA technology, Gene expression and regulation.

UNIT-III: Recombinant protein production.

UNIT-IV: Hybridoma technology and its application in parasitology.

UNIT-V: Molecular diagnosis and Phylogeny. Expression of antigens and antibody fragments useful as diagnostic reagents and vaccines. Restriction Fragment Length Polymorphism (RFLP), Polymerase Chain Reaction, modified PCR and related techniques, Random Amplified Polymorphic DNA (RAPD), Nucleic acid probe and Cleavage Length Fragment Polymorphism (CFLP).

UNIT-VI: Types of immune responses produced by various parasites, novel and other antigens, proteases and cytokines in vaccine production.

UNIT-VII: Nucleic acid vaccines. Vectored parasitic vaccines.

Practical

Identification, characterization, and purification of antigens, analysis of parasite protein antigens, preparation of polyclonal antibodies. RAPD, RFLP, PCR, modified PCR and related techniques. DNA and RNA isolation protocols from blood, tissues and parasites and immuno- assays for studying the vaccine response.

Suggested Readings

Selected articles from journals.

VPA 703 HOST PARASITE INTERACTIONS 2+0 SEM - I

Objective

To understand the importance of host-parasite interactions.

Theory

UNIT-I: Introduction, distribution of parasites on/in the host, morphological specializations for life on the host.

UNIT-II: Behavioural defenses, host immune responses and genetic resistance to parasites.

UNIT-III: Establishment of parasites in immuno-competent, susceptible, intermediate and abnormal hosts, chronicity of parasitic infections, immuno-evasive strategies of the parasites, host-parasite equilibrium.

UNIT-IV: Pathology of host parasite interactions, host parasite interactions in relation to malnutrition and micronutrient metabolism.

Suggested Readings

Selected articles from journals.

VPA 704 ADVANCES IN PROTOZOOLOGY 2+1 SEM - II

Objective

To discuss the latest scientific developments on various aspects of protozoan parasites.

Theory

UNIT-I: Advanced studies on taxonomy, molecular biology, pathogenesis, immunology and serology of intestinal protozoa.

UNIT-II: Advanced studies on taxonomy, molecular biology, pathogenesis, immunology and serology of haemoprotozoans.

UNIT-III: Advanced studies on taxonomy, molecular biology, pathogenesis, immunology and serology of tissue and other protozoa

Practical

Morphological, pathological and immunodiagnostic studies on various protozoan parasites.

Suggested Readings

Selected articles from journals.

VPA 705 ADVANCES IN HELMINTHOLOGY – I 2+1 SEM - I

Objective

To discuss the latest scientific developments on various aspects of trematodes and cestodes.

Theory

UNIT-I: Advanced studies on taxonomy, molecular biology, pathogenesis, immunology and serology of trematodes and their larval stages.

UNIT-II: Advanced studies on taxonomy, molecular biology, pathogenesis, immunology and serology of cestodes and metacestodes.

Practical

Morphological, pathological and immunodiagnostic studies on various trematodes and cestodes.

Suggested Readings

Selected articles from journals.

VPA 706 ADVANCES IN HELMINTHOLOGY – II 2+1 SEM - II

Objective

To discuss the latest scientific developments on various aspects of nematodes and thorny-headed worms.

Theory

UNIT-I: Advanced studies on taxonomy, molecular biology, pathogenesis, immunology and serology of nematodes and their larval stages.

UNIT-II: Advanced studies on taxonomy, molecular biology, pathogenesis, immunology and serology of thorny-headed worms.

Practical

Morphological, pathological and immunodiagnostic studies on various nematodes and thorny-headed worms.

Suggested Readings

Selected articles from journals.

VPA 707 ADVANCES IN ENTOMOLOGY AND ACAROLOGY 2+1 SEM - I

Objective

To discuss latest scientific developments on various aspects of arthropods.

Theory

UNIT-I: Origin, evolution, regional and seasonal distribution, forecasting insect and acarine population through biological modelling.

UNIT-II: Population dynamics of insects and acarines in relation to biotic and abiotic factors.

UNIT-III: Recent developments pertaining to insects of veterinary importance.

UNIT-IV: Recent developments pertaining to arachnids of veterinary importance.

UNIT-V: Chemical, biological, immunological control measures and in-depth study of integrated pest management. Modulation of vector competence to transmit parasitic infections using molecular genetics by developing transgenic vectors.

Practical

Identification of arthropods of veterinary importance in the region. Dissection of arthropods for recovery of infective stages of parasites. Immunopathological changes in the host tissues due to haemato-phagous arthropods.

Suggested Readings

Selected articles from journals.

VPA 708 *IN VITRO* CULTIVATION OF PARASITES 1+2 SEM - II

Objective

Development of skills for cultivation of various parasites in the laboratory for research and practical control.

Theory

UNIT-I: Introduction, problems and goals.

UNIT-II: *In vitro* cultivation of genital flagellates, intestinal flagellates and intestinal ciliates.

UNIT-III: *In vitro* cultivation of intestinal and tissue protozoa.

UNIT-IV: *In vitro* cultivation of haemoprotozoans.

UNIT-V: *In vitro* techniques, media and tissue culture for cultivation of helminths and their larval stages.

UNIT-VI: *In vitro* mass rearing and colonization of ticks, flies and other insects**.**

Practical

Preparation of media and cultivation of important parasites, raising and maintenance of cell-lines of important parasites.

Suggested Readings

Selected articles from journals.

VPA 709 EMERGING AND RE-EMERGING PARASITIC DISEASES 2+0 SEM - II

Objective

To study the emerging and re-emerging parasitic diseases.

Theory

UNIT-I: Emerging and re-emerging helminthic diseases.

UNIT-II: Emerging and re-emerging protozoan diseases.

UNIT-III: Emerging and re-emerging vector-borne diseases.

Suggested Readings

Selected articles from journals.

VPA 710 BIONOMICS OF PARASITES 3+0 SEM - I

Objective

To study ultrastructure, physiology, biochemistry and bionomics of important parasites.

Theory

UNIT-I: Ultrastructure, physiology, biochemistry and bionomics of trematodes and cestodes of veterinary importance.

UNIT-II: Ultrastructure, physiology, biochemistry and bionomics of nematodes of veterinary importance.

UNIT-III: Ultrastructure, physiology, biochemistry and bionomics of important arthropod parasites.

UNIT-IV: Ultrastructure, physiology, biochemistry and bionomics of important protozoan parasites.

Suggested Readings

Selected articles from journals.

VPA 711 ENVIRONMENTAL PARASITOLOGY 1+1 SEM - I

Objective

To study the effect of environmental changes and ecological disturbances on the emergence, proliferation and transmission of parasitic diseases.

Theory

UNIT-I: Environmental changes and ecological disturbances due to natural phenomenon and human interventions (demographic, societal and agricultural changes, global warming, floods, hurricanes and pollution etc.).

UNIT-II: Effect of environmental changes and ecological disturbances on the proliferation and transmission of helminthic diseases.

UNIT-III: Effect of environmental changes and ecological disturbances on the proliferation and transmission of protozoan diseases.

UNIT-IV: Effect of environmental changes and ecological disturbances on the proliferation of intermediate hosts and vectors and their role in transmission of diseases.

Practical

Examination of water, soil, meat and vegetables etc. to record the contamination with parasites due to environmental changes. Assessment of effect of temperature and humidity on the development of parasites. Use of Process-based (mathematical) models to express the scientifically documented relationship between climatic variables and biological

parameters e.g., vector breeding, survival and biting rates; parasite incubation rates.

Suggested Readings

Selected articles from journals.

VPA 790 SPECIAL PROBLEM 0+2 SEM - I, II

Objective

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

Practical

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

VETERINARY PARASITOLOGY

List of Journals

- Advances in Parasitology
- Experimental Parasitology
- International Journal for Parasitology
- Journal of Helminthology
- Journal of Parasitic Diseases
- Journal of Protozoology
- Journal of Protozoology Research
- Journal of Veterinary Parasitology
- Medical and Veterinary Entomology
- Parasitology
- Parasitology International
- Trends in Parasitology
- Veterinary Parasitology

e-Resources

- http://www.sciencedirect.com/science/journal/03044017 (Veterinary. Parasitology)
- http://www.sciencedirect.com/science/journal/14714922 (Trends in Parasitology)
- http://www.sciencedirect.com/science/journal/00207519 (International Journal for Parasitology)
- http://www.sciencedirect.com/science/journal/13835769 (Parasitology International)
- http://www.sciencedirect.com/science/journal/00144894(Experimental Parasitology)
- http://journals. Cambridge.org (Parasitology)
- http://asp.unl.edu (Journal of Parasitology)
- http://www.bentham.org/open/toparaj (The open Parasitology Journal)
- http://www.springer.com/biomed/medical+microbiology)Journal/436 (Parasitology Research)
- http://parasitologyindia.org (Journal of Parasitic Diseases)
- http://www.waap.org (World Assoc. for Advancement of Vety. Parasitology)

Suggested Broad Topics for Master's and Doctoral Research

- Detection and management of antiparasitic drug resistance.
- Studies on the efficacy of medicinal plants/herbal preparations against various parasites affecting domestic animals and poultry and the effect of these plants on pathogenicity and immunology of parasites
- Development of immunoprophylactic measures and immunodiagnostic techniques using modern molecular and biotechnological based tools for important parasitic diseases prevalent in the state
- Application of remote sensing and GIS for the management of parasitic diseases.
- Studies on application of host's resistance as a part of integrated parasite management programme.