Parasitology

Course Structure

Semester 3

Course No.	Course Title	Nature of course	Credits	Full Marks
Par 622	General and Molecular Parasitology	T	4	100
Par 623	Protozoology, Zoonoses & Entomology	T	4	100
Par 624	Environment, Health & Immunization	T	4	100
Par 625	Helminthology & Research Methodology II	T	4	100
Par 626	Protozoology, Zoonoses & Entomology	P	2	50
Par 627	Helminthology & Molecular Parasitology	P	2	50
Par 628	Dissertation Proposal & Seminar		1	25
Total			**21**	**525**

Semester 4

Par 657	Epidemiology & Pharmacology	T	3	75
Par 658	Thesis	.	4	100
Total			**7**	**175**

Tribhuvan University
Institute of Science and Technology
M Sc Zoology
Semester System
2070

Semester III

Parasitology

Course Title: General and Molecular Parasitology **Credits: 4**

Course No.: Par 622 **Lecture hrs: 60**

Nature of the Course: Theory **Full Marks: 100**

Pass Marks: 50

Objective

To introduce general Parasitology and to impart advanced knowledge on some important microbial parasites.

Course Contents

General Parasitology: Scope and historical landmarks in Parasitology. Basic principles and nomenclature aspects of parasites. Parasitology as an academic and applied science. Parasite fauna of hosts belonging to different groups. Zoogeography of parasites. Host parasite inter-relationship. Properties of parasites. Host specificity. Kinds of parasites. Hyperparasitism. Parasitoids. Relation of parasite fauna with the food, age and migration of the host and season of the year. **25 hrs**

Molecular Parasitology: Virus: Introduction and molecular characteristics, mode of transmission, clinical presentation and control measures of human viral diseases (Hepatitis A, B & C, Dengue, Mumps, Influenza and HIV). General introduction to bird flu (avian influenza).

Bacteria: General characteristics, culture characters, pathogenesis, laboratory diagnosis and control measures of human bacterial diseases (Meningitis, Tuberculosis, Typhoid and Leprosy). Bacteriology of water, milk and air. Biological warfare: Bioterrorism.

Fungi: Opportunistic mycoses: defination and list. Candidiasis (*Candida albicans*).

Biochemical and molecular techniques and their application: Concept of centrifugation, spectrophotometry, electrophoresis, chromatography, westernblotting, southern and northern blotting, ELISA, PCR and RFLP.

35 hrs

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Semester III

Parasitology

Course Title: Protozoology, Zoonoses & Entomology **Credits: 4**

Course No. : Par 623 **Lecture hrs: 60**

Nature of the Course: Theory **Full Marks: 100**

Pass Marks: 50

Objective

To impart advanced knowledge on various important protozoan parasites including some important microbial parasites and insects of medical, veterinary and agricultural importance.

Course Contents

Protozoology: Amoebae : *Entamoeba histolytica, Naegleria fowleri, Acanthamoeba.* Flagellates: *Giardia lamblia, Trichomonas vaginalis, Trypanosoma, Leishmania.* Sporozoans: *Plasmodium, Toxoplasma gondii, Cryptosporidium parvum, Cyclospora cayetanensis.* Veterinary importance protozoans: *Trypanosoma evansi, Eimeria, Isospora,* and *Babesia bigemina*. Biology of above medical and veterinary importance protozoan parasites. **25 hrs**

Parasitic Zoonoses: Introduction. Nature and epidemiology of zoonotic viral diseases (Rabies, Japanese encephalitis). Bacterial diseases (Brucellosis, Plague) and Protozoan diseases (Toxoplasmosis, Trypanosomiasis, Leishmaniasis and Babesiosis). **10 hrs**

Entomology: Structure, feeding habit and effect of bites of arthropod vectors. Method of pathogen transmission, causal organisms, remedies and prevention with reference to following forms: Hemiptera and Heteroptera (bed-bug), Anoplura and Mallophaga (lice), Siphonoptera (fleas), Diptera (mosquitoes, sandfly, tsetse fly). Blood-sucking and disease carrying flies. Ticks: *Dermacenter* (cow tick) and mites (*Sarcoptis scabiei*). Fly maggots and myiasis. Control of vector and vector-born diseases (chemical, biological, environmental, genetical and integrated). **25 hrs**

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Semester III

Parasitology

Course Title: Environment, Health & Immunization **Credits: 4**

Course No.: Par 624 **Lecture hrs: 60**

Nature of the Course: Theory **Full Marks: 100**

Pass Marks: 50

Objective

To impart advanced knowledge on Environment and Health, Immunization and important Helminth parasites of medical, veterinary and agriculture importance.

Course Contents

Environment and Health: Health status and health problems with reference to Nepal. Health Planning and Management. Health programmes in Nepal including malaria, filaria, leprosy, tuberculosis, kala-azar and AIDS. Water-related diseases. Water quality-criteria and standards emphasizing microbiological aspects. Surveillance of drinking water quality. Disposal of excreta. Bio-medical waste management. Milk Hygiene and milk-born diseases. Food hygiene and food-borne infections (bacterial, viral, protozoan and helminthic). Disasters and communicable diseases. Emerging and re-emerging infectious diseases. Socio-economic consequences and prospects for the control and prevention of parasitic diseases with special reference to Nepal. Ecological management and preventive measures of parasitic diseases with reference to Nepal. Influence of human activity on the parasitic fauna of animals and man. **30 hrs**

Concepts of Health and Diseases: Phases of changing concepts, dimensions, determinants, responsibility and indicators of health. Concepts of disease: concepts of causation, control, prevention, modes of intervention, population medicine. Health communication. Practice of health education. Brief account of national and international agencies working for health and diseases in Nepal. **20 hrs**

Immunization: Immune response to bacterial, viral, protozoans and helminthic infections. Immunizing agents. Type of vaccine. The cold chain. Community based control by vaccination. Factors influencing the success of vaccination. Current vaccine practice. Hazards of immunization. **10 hrs**

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Semester III

Parasitology

Course Title: Helminthology & Research Methodology II **Credits: 4**

Course No. Par 625 **Lecture hrs: 60**

Nature of the Course: Theory **Full Marks: 100**

Pass Marks: 50

General Objective

To impart advanced knowledge on Environment and Health, Immunization and important Helminth parasites of medical, veterinary and agriculture importance.

Course Contents

Helminthology: Trematoda : Life cycle patterns in Trematoda. Biology of monogeneid. Life cycle of *Gyrodactylus elegans* and *Polystoma integerrimum.* General organization, life-cycle, pathology, laboratory diagnosis, control and prevention of diseases caused by *Clonorchis sinensis, Paragonimus westermani*. Characteristics of *Gastrothylax* species, Strigeidae, Diplostomatidae and Prohemistomidae. **8 hrs**

Cestoda: Comparative study of scolices in cestodes. Life cycle pattern of cestodes. General organization, pathology, control, and prevention of diseases caused by *Diphyllobothrium latum*, *Dipylidium caninum* and *Moniezia expansa*. **8 hrs**

Acanthocephala and Zoonoses: General organization and life-cycle of Acanthocephala. Knowledge of nature of Helminthic zoonotic diseases: Clonorchiasis, Fasciolopsias, Echinococcosis, Taeniasis and Trichinellosis. **4 hrs**

Nematoda: General organization, life cycle and economic importance of Nematodes with reference to following forms- Human : *Strongyloides stercoralis, Trichuris trichura, Ancylostoma duodenale.* Veterinary: *Trichostrongylus orientalis, Haemonchus contortus, Thelazia callipaeda.* Plant: Stem nematodes (*Anguina tritici*). Root-gall nematodes (*Meloidogyne incognita*). Cyst-nematodes (*Heterodera and Globodera*). Predatory (*Mononchus*). Migratory (*Xiphinema*) and Free living soil nematodes: *Tylenchus, Rhabditis* and *Dorylaimus*. Insect: *Steinernama* and *Heterorhabditis*. Role of plant parasitic nematodes in agriculture with reference to nematode diseases of potato, rice and citrus plants. Effects of agricultural practices in nematode population. Introduction to Bacteriophagus, Entomopathogenic and Predatory nematodes. **20 hrs**

Research Methodology: Characteristics and significance of a good research. Research process. Developing a research proposal. Selection and formulation of the research problem. Literature review. Formulation of research objectives. Development of workable hypothesis. Research design. Sampling and sample size. Data sources and collection techniques. Data analysis. Data presentation. Formats for references. Writing a research report/thesis. Writing a research paper for a journal of international repute. Ethics of research and publication. **20 hrs**

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Semester III

Parasitology

Course Title: Protozoology, Zoonoses & Entomology **Credits: 2**

Course No. Par 626 **No. of Practicals: 30**

Nature of the Course: Practical **Full Marks: 50**

Pass Marks: 25

General Objective

To provide practical knowledge of various techniques used in examination of living hosts, collection, preservation, permanent slides preparation and identification of various protozoan & zoonotic parasites and arthropod vectors.

Course Contents

Examination of different living animal hosts (domestic and wild) for collection, preservation, mounting and identification of protozoan parasites and arthropod vectors.

Preparation and study of protozoan culture.

Study of permanent slides of protozoan parasites and arthropod vectors; Microscopical examination of blood smears for protozoan parasites and isolation and identification of protozoan cysts and eggs of Helminth parasites from feacal samples.

Use of Oculomicrometer and Stagemicrometer for measurement. Study of blood smears for differential count and cell morphology. Use of tally counter for parasite and cell count. Use of ICT/RDT.

Microtome of the infected tissues of the hosts and arthropod vectors and study of permanent slides of different developmental stages of parasites and vectors.

Examination of microbiological quality of drinking water.

Preparation of field survey report (general survey and status of medical and veterinary importance parasites and parasitic diseases in Nepal or case report) and practical class-record

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Semester III

Parasitology

Course Title: Helminthology & Molecular Parasitology **Credits: 2**

Course No.: Par 627 **No. of Practicals: 30**

Nature of the Course: Practical **Full Marks: 50**

Pass Marks: 25

Objective

To provide practical knowledge of various techniques used for the study of helminth and microbial parasites

from both invertebrate and vertebrate hosts as well as vectors of pathogens with special reference to examination, observation, collection, preservation, permanent slide preparation and identification of different parasites of both definitive and intermediate hosts and vectors.

Course Contents

Examination of living animal hosts (definitive and intermediate: earthworm, cockroach, bony fish, toad, wall lizard, garden lizard, pigeon, fowl, rat etc.) for collection, preservation, and identification of different helminth parasites. Identification of helminth parasites of man.

Studies of different sections (transverse, longitudinal, sagittal) of parasites by using microtomy method and Histopathological studies of different types of infected tissues of the host.

Preparation of Helminth Culture.

Extraction and slide preparation of nematodes from different habitats including the isolation of the entomopathogenic nematodes and sampling and estimation of population of nematodes from soil and plant tissues.

Microscopical Examination of blood smears for microfilariae. Sputum smears preparation of micro-organisms.

Production of *Fasciola* metacercariae from egg, and collection of larval trematodes from infected snails and preparation of their mounts.

Measurement of mortality and morbidity.

Microphotography of parasites. Identification of photos of different stages of parasites and diseases.

Preparation of field survey report (general survey and status of medical veterinary and agricultural importance parasites and parasitic diseases in Nepal or case report) and practical class-record.

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Semester III

Parasitology

Course Title: Dissertation Proposal & Seminar **Credit: 1**

Course No.: Par 628 **Lectures: 60**

Nature of the Course: Research **Full Marks: 25**

Pass Marks: 12.5

Objective

To strengthen the knowledge of students in research based academic activities and to develop a research proposal of thesis for semester IV.

The students will select topic for their research work related to their special/elective paper. The students will prepare a research proposal by studying published research works in the related area. The research proposal will be discussed with research committee of the department. After which the department will formally appoint supervisor/s for the research project. Each student will work for research under the supervision of assigned supervisor in the department. After completing the proposal, it is mandatory to present in a seminar.

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Semester IV

Parasitology

Course Title: Epidemiology & Pharmacology **Credits: 3**

Course No. Par 657 **Lecture hrs: 45**

Nature of the Course: Theory **Full Marks: 75**

Pass Marks: 37.5

Objective

To share and impart basic and advanced knowledge of Epidemiology and Pharmacology and to apply it in research methodology of various parasites so as to obtain relevant findings to apply the research findings in prevention and control of parasites to upgrade the quality of life.

Course Contents

Principles of Epidemiology and Epidemiologic Methods: Definition, aims and uses of Epidemiology. Basic measurements in Epidemiology. Tools of measurement. Measurement of mortality, morbidity; incidence and prevalence of diseases. Selected definitions pertaining to Infectious diseases epidemiology. Modes of transmission of communicable diseases. Parasitic opportunistic infections in AIDS cases and Nosocomial parasitic infections. Health advice to travelers. Sterilization and disinfection. **25 hrs**

Pharmacology: Routes of drug administration (local and systemic). Pharmacokinetics: absorption of the drug, drug distribution, metabolism of drug, storage and excretion. Pharmacodynamics: drug target, site of drug action, principles of drug action, factors affecting drug action, mechanism of drug action. Antimicrobial agents: Definition, classification. Antibiotics- its rule while using, mechanism of action of antibiotics, problems while using antimicrobial agents. Anthelmintics and antiprotozoan medicines. **20 hrs**

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Semester IV

Parasitology

Course Title: Thesis **Credits: 4**

Course No.: Par 658 **Full Marks: 100**

Nature of Course: Research (Compulsory) **Pass Marks: 50**

General Objective

To produce M.Sc. dissertation based on original research study in priority areas of Parasitology.

Specific Objective

To develop scientific observation of natural phenomenon, skill to analyze and understand for logical interpretation

To know various methodological tools including instruments and apply them in the field studies

To develop confidence on seminar presentation and defend the dissertation work

Dissertation Work

The dissertation work is compulsory for all the students in order to develop skills and handle the research study independently. The students will work on the proposal developed in Par 628 of semester III under the formally appointed dissertation supervisor/s. However, the student will work independently and will take full responsibility of completing the proposed task on time. The supervisor will be available for consultation and review. The dissertation will be evaluated by a committee of expert including an external examiner. Students will have to present their work and defend it in an open viva-voce.

The Student must complete a dissertation work and should submit it within the academic session of the fourth semester. The duration can however be extended by the research committee with the consent of the head of the department on request form the student and the recommendation of the concerned supervisor with reasonable explanation.

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