

Parasitology

Course title: Parasitology

Course No. Zool. 641

Nature of the course: Theory

Course description: General Parasitology, Molecular Parasitology, Protozoology, Parasitic Zoonoses and Entomology

Full Marks: 100

Pass Marks: 40

Year: II

General Objective:

to introduce general Parasitology and

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

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: define 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**

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*, *Isoospora*, 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). **8 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), blood-sucking and disease carrying flies, Ticks: *Dermacentor* (cow tick) and mites (*Sarcoptes scabiei*), fly maggots and myiasis. Control of vector and vector-borne diseases (chemical, biological, environmental, genetical and integrated). Insects causing vesication, urtication and venenation in man. **30 hrs**

Parasitology

Course title: Parasitology

Course No. Zool. 642

Nature of the course: Theory

Course description: Environment and Health, Immunization and Helminthology.

Full Marks: 100

Pass Marks: 40

Year: II

General 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-borne 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. **35 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. **15 hrs**

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. **12 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*. **15 hrs**

Acanthocephala and Zoonoses: General organization and life-cycle of Acanthocephala. Knowledge of nature of Helminthic zoonotic diseases: Clonorchiasis, Fasciolopsias, Echinococcus, Taeniasis and Trichinellosis. **8 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. **35 hrs**

Parasitology

Course title: Parasitology

Course No. Zool. 643

Nature of the course: Theory

Course description: Epidemiology, Health & Disease, Pharmacology and Research Methodology

Full Marks: 100

Pass Marks: 40

Year: II

General Objective:

to share and impart basic and advanced knowledge of Epidemiology, Health and Diseases,
to apply it in research methodology of various parasites so as to obtain relevant findings and
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. **35 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. **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. **30 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. **30hrs**

Parasitology

Course title: Parasitology

Course No. Zool. 644

Nature of the course: Practical I

Course Description : General & Molecular Parasitology, Protozoology and Entomology.

Full Marks: 50

Pass Marks: 20

Year: II

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 parasites and arthropod vectors.

Specific Objectives:

- to develop skill and ability on the study of protozoan culture,
- to acquaint the students with the practical knowledge of blood smears for various protozoan parasites,
- to make them familiar with the critical examination, isolation and identification of eggs (helminthes) and cysts of parasites from fecal samples,
- to help them be familiar with the use of oculomicrometer, stage micrometer as well as microtomes.

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 fecal 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

Parasitology

Course title: Parasitology

Course No. Zool. 645

Nature of the course: Practical II

Course Description: Environment and Health, Immunization and Helminthology Epidemiology, Health & Disease, Pharmacology and Research Methodology

Full Marks: 50

Pass Marks: 20

Year: II

General Objective:

To provide practical knowledge of various techniques used for the study of 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.

Specific Objectives:

- to develop skill and ability on the histopathological studies and the helminth culture techniques,
- to extract and prepare slides of nematode parasites from different habitats including isolation of the entomopathogenic nematodes,
- to make familiar the students with the sampling and estimation of population of nematodes from soil and plant tissues,
- to acquaint the students with the technique of producing *Fasciola* metacercariae from eggs and
- to make them familiar with the methodology in the collection of larval trematodes from the infected snails and their permanent slide preparation.

Course Content :

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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Tribhuvan University

Master Level (2 Yrs/IIst Yr)Sc. & Tech.

Full Mark: 100

Zoology 641 (Gen. parasit., Mol. parasit., Protozool. and Ent.)

Pass Marks: 40

Time : 4 hrs

Model Question (New course, 2065)

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Illustrate your answers with suitable diagrams wherever necessary.

Group A

Attempt any two questions

2x10=20

1. Explain various effects of parasitism on parasites.
2. Define bioterrorism. Describe the characteristic features of one of the agents causing this terror that you have studied.
3. Give an account of avian flu viruses. How is avian flu being a global health problem? Mention its remedies.

Group B

Attempt any two questions.

2x10=20

4. Illustrate the structure, lifecycle and pathogenicity of kala-azar causing organism..
5. Give an account of the blood sucking and diseases carrying insects.
6. What are zoonotic diseases? Describe viral and bacterial diseases of this category.

Group C.

Attempt all questions.

8x5=40

7. Give the pathogenicity of *Entamoeba histolytica*.
8. Explain how the season of the year influence the parasit fauna.

or

Write a short note on coprozoic protozoans.

9. Mention the laboratory diagnosis of tuberculosis and Typhoid.
10. Comment upon the medical importance of Babesiosis.
11. Explain biological aspect of vector control.

or

What is the role of intermediate hosts in zoogeography of parasites.

12. Describe the characteristic features of Hemiptera.
13. Elaborate the biology of *Cryptosporidium* spp.
14. What are repellents and fumigants? Mention their importance in public health with appropriate examples.

Group D.

All are compulsory

8x2.5=20

15. Give the very short answers of the following:
 - i. Meaning of hyperparasitism.
 - ii. Mouthparts of bedbug.
 - iii. Mode of transmission of pneumonia and leprosy.
 - iv. Give five important properties of parasites.
 - v. Myiasis and its causative agents.
 - vi. Differentiate between phoresis and biological vector.
 - vii. Factors for AIDS to be pandemic.
 - viii. Candidiasis

Tribhuvan University

Master Level (2 Yrs/IIst Yr)Sc. & Tech.

Full Mark: 100

Zoology 642 (Env. and Health, Immun. and Helmin.)

Pass Marks: 40

Time : 4 hrs

Model Question (New course, 2065)

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Illustrate your answers with suitable diagrams wherever necessary.

Group A

Attempt any two questions

2x10=20

1. Discuss the National Malaria eradication program conducted by Nepal Government.
2. What is food poisoning ? Describe the cause and control of food born diseases caused by bacteria.
3. Discuss the socio-economic consequence and prospects for the control and prevention of parasitic diseases with reference to Nepal.

Group B.

Attempt any two questions.

2x10=20

4. Enumerate the mode of infection and life-cycle of *Polystoma integerrimum*.
5. Describe the biology of *Trichuris trichura* and pathogenicity caused by it.
6. Enumerate different types of parasitic nematodes that cause diseases to rice plants.

Group C.

Attempt all questions.

8x5=40

7. Give the economic importance of milk born diseases.
8. Explain in brief how quality of drinking water is tested.
9. Define vaccine. Differentiate between live vaccine and killed vaccine.

10. Differentiate the characters of Strigeidae and Diplostomatidae.
11. Give the labeled figure of different types of Bothridia in Cestodes.

or

What is Zoonoses? Discuss any one zoonotic disease that you have studied.

12. Describe the organization of Health delivery system in Nepal from ministry of health to sub-health post and their staffing pattern.
13. Briefly describe the hazards of immunization.
14. Explain effect of agricultural practices on nematode population.

or

Illustrate the general life-cycle pattern of Acanthocephala.

Group D.

All are compulsory

8x2.5=20

15. Give the very short answers of the following:
 - i. What do you mean by emerging diseases? Give five new infections parasites recognised since 1973.
 - ii. Which micro-organism is an indicator of faecal pollution and why?
 - iii. Mention the drugs used for the treatment of hookworm.
 - iv. Mention 2 ways for Bio-medical waste management.
 - v. What is cold-chain system?
 - vi. Mention the economic importance of *Thelazia callipaeda*.
 - vii. Write a brief note on *Heterorhabditis*.
 - viii. Give a labelled diagram of mature proglottid of *Moniezia expansa*.

Tribhuvan University

Master Level (2 Yrs/IIst Yr)Sc. & Tech.

Full Mark: 100

Zoology 643 (Epid., Health & Disease, Pharmac. and Res. Method.) Pass Marks: 40

Time : 4 hrs

Model Question (New course, 2065)

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Illustrate your answers with suitable diagrams wherever necessary.

Group A

Attempt any two questions

2x10=20

1. What are the routes of drug administration?
2. Give WHO definition of health. Elaborate different indicators of health.
3. What are communicable diseases and routes of their transmission.

Group B.

Attempt any two questions.

2x10=20

4. Describe the necessity and techniques of selection and formulation of research problem.
5. Explain the concept of health and briefly describe the changing health concepts with examples.
6. Explain briefly the techniques of data presentation

Group C.

Attempt all questions.

8x5=40

7. Define epidemiology. Explain its aims and uses.
8. Describe the significance of publication of research paper for a journal of international repute.
9. Briefly describe sterilization and disinfection techniques.
10. Classify antibiotics according to mechanism of action.

11. Comment upon the international health organizations working in Nepal.

or

What are the principles involved in communication to bring about behavioral changes in the community?

12. Write a brief account on opportunistic infections in AIDS cases.

13. Mention the principles of drug action.

14. Write a note on excretion of drugs.

or

absorption of drugs.

Group D.

All are compulsory

8x2.5=20

15. Give the very short answers of the following:

- i. Teratogenicity
- ii. Pharmacodynamics and Pharmacokinetics
- iii. Characteristics of a good research.
- iv. Importance of defining objectives of research work.
- v. Differentiate epidemic and pandemic.
- vi. Differentiate incidence and prevalence.
- vii. Measurement of morbidity.
- viii. Mention three ethics in publications.