Tribhuvan University
Institute of Science and Technology
Four Years B. Sc. Zoology Course of Study

Course Title : Non-chordata and Protochordata **Full Marks : 100**
Course No. : B. Sc. Zool.101 **Pass Marks : 35**
Nature of Course : Theory **Year : I**
Instruction Lectures: 150

Course Objectives:
At the end of course students will be able to:

- Classify the non-chordates up to Orders with their examples.
- Know the functional anatomy of typical representative/s of each Phylum.
- Understand polymorphism, parasitism, social life etc. of some non-chordates.
- Know the economic importance of non-chordate animals.
- Know the structures, affinities and development of Protochordates.

Group A : Lower Non-chordata

Taxonomy: Concept, trends and significance of taxonomy. Concept of Protozoa and Metazoa and the origin of Metazoa. Classification of Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes and Annelida up to orders with characters and examples. (**10 lec.)**

Protozoa: Habit, habitat, structure and reproduction of *Vorticella*. Structure, life cycle, pathogenicity and control measures of *Leishmania donovani, Giardia lamblia, Entamoeba histolytica, Trichomonas vaginalis, Eimeria tenella* and *Babesia bigemina*. (**14 lec.)**

Porifera: Habit, habitat, structure, reproduction and embryogeny of *Scypha.* Introduction and examples of freshwater sponges. Canal and skeletal systems. Economic importance of Porifera. (**7 lec.)**

Coelenterata: Habit, habitat, structure, reproduction and development of *Obelia*. Polymorphism. Distribution, types and formation of corals and coral reefs. Coral and dinoflagellate symbiosis and coral bleaching. Human intrusion in coral reefs. Economic importance of Coelenterates. **(12 lec.)**

Platyhelminthes: Structure, life cycle, pathogenicity and control measures of *Fasciola hepatica, Schistosoma haematobium, Taenia solium* and *Echinococcus granulosus*. Morphological and physiological adaptations of helminth parasites. **(12 lec.)**

Aschelminthes: Structure, life cycle, pathogenicity and control measures of *Ascaris lumbricoides, Ancylostoma duodenale, Enterobius vermicularis, Wuchereria bancrofti* and phyto-nematode (*Meloidogyne incognita*). Economic importance of Aschelminthes. (**10 lec.)**

Annelida: Coelom and Nephridia in Annelida. Structure, organ systems, life cycle and parasitic adaptations of *Hirudinaria granulosa*. Introduction to vermicomposting. Economic importance of annelids. **(10 lec.)**

Group B: Higher Non-chordata and Protochordata

Taxonomy: Classification of Arthropoda, Mollusca, Echinodermata and Protochordata up to orders with characters and examples. (**6 lec.)**

Arthropoda: General morphology and economic importance of spiders, mites and ticks. Organ systems of freshwater prawn (*Palaeomon*). Structure, life history and economic importance of *Periplaneta americana*, *Phlebotomus argentipus, Culex quinquefasciatus, Aedes aegypti* and *Sitophilus oryzae*. Mouthparts of insects. Metamorphism in insects. Social behavior of termites. Economic importance of Arthropods. **(25 lec.)**

Mollusca: Shells in Mollusca. Structure and organ systems of Apple Snail (*Pila globosa),* fresh water mussel: *Lamellidens* (=*Unio*). Pearl and its formation. Dispersal, damage and control measures of African Giant Land Snail (*Lissachatina fulica*). Torsion and detorsion in Gastropoda. Economic importance of molluscs. **(22 lec.)**

Echinodermata: Structure, organ systems and development of *Asterias*. Larval forms in Echinodermata. (**8 lec.)**

Protochordata: Structure, organ systems and affinities of *Balanoglossus*, *Herdmania and Branchiostoma*. Development of Herdmania. (1**4 lec.)**

Text Books (latest eds.):

Jordan, E.L. & Verma, P.S. Invertebrate Zoology. S. Chand & Co. Pub., 857 pp.

Jordan, E.L. & Verma, P.S., Chordate Zoology & Animal Physiology. S. Chand, New Delhi.

Kotpal, R.L. Modern textbook of Zoology: Invertebrates. Rastogi Pub., Meerut,India.

Kotpal, R.L. Modern textbook of Zoology: Vertebrates. Rastogi Pub., Meerut,India.

Parker, T.J. & Haswell, W..A. A text book of Zoology, Vol. 1. The McMillan Press Ltd. London, U.K.

Suggested Readings:

Barnes, R.D. Invertebrate Zoology. Saunders College Pub.,1089 pages

Dhami, P.S. and Dhami, J.K. Invertebrate Zoology. R. Chand & Co. Pub., New Delhi, India.

http//:www.archive.org

http://www.biodiversitylibrary.org

Prasad, S.N. Life of Invertebrates. Vikas Publishing House Pvt. Ltd., New Delhi, India.

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Tribhuvan University
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Four Years B. Sc. Zoology Course of Study

Course Title: Non-chordata and Protochordata **Full Marks : 50**
Course No. : B. Sc. Zool.102 **Pass Marks : 20**
Nature of course : Practical **Year : I**

Course Objectives:

At the end of this course students will be able to:

- Identify representatives of different Phyla of Non-chordates and Protochordates.
- Know the pathogenic animals; histology of different organs of non-chordate animals.
- Know the structure of mouth-parts of insects and structure of larval forms of different arthropods.
- Know the basic differences in general anatomy of different animals.

Techniques: Collection and preservation of Non-chordates.

Taxonomy: Identification of Non-chordates (collection, museum specimens and permanent slides).

Culture: Protozoan culture.

Permanent histological slides: Sections of *Fasciola, Ascaris, Hirudinaria, Balanoglosus* and *Amphioxus.*

Slide preparations:

1. Temporary slide preparation:
   Any cultured organism, Statocyst of prawn, Jaw of snail/slug, Jaw of *Hirudinaria,* Mosquito larva and Nematodes of animals.
2. Permanent slide preparation:
   Radula of snail; mosquito larva; mouthparts of mosquitoes, cockroach, honeybee, house fly and butterfly; *Daphnia/Cyclops/Cypris*.

Morphology and anatomy (Dissection):

1. Leech – General Anatomy, Excretory and Reproductive.
2. Prawn - Appendages, Nervous system and Digestive organs.
3. Cockroach – General anatomy, digestive organs, nervous system and reproductive organs
4. Apple snail (*Pila*) – General anatomy and Nervous system.

Case study and report writing (any one)

i) Medical diseases
ii) Veterinary diseases
iii) Agriculture pests
iv) Faunal survey/ Field trip (one day).

Practical note book preparation as regular study.

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