

**DRAFT SYLLABUS OF M.Sc ZOOLOGY
SEMESTER - I**

SESSION 2013-2014

Approved by the Academic Council in its meeting held on 26th July 2013.

**DEPARTMENT OF ZOOLOGY
SIKKIM UNIVERSITY
GANGTOK**

ZOO 101

FUNCTIONAL BIOLOGY IN NON-CHORDATES AND PARASITOLOGY

UNIT I

Definition, mechanism of nutrition in lower metazoans.

Hydrostatic movements in Cnidaria, Annelida and Echinodermata; Metamerism, significance of segmentation with reference to locomotion.

Respiratory pigments -Types and chemical nature in Non-chordates and their role in respiration, Osmoregulation in Non-chordates.

UNIT II

Metamorphosis and reproductive strategies in insects with reference to insect hormones.

Primitive and advance types of nervous system, cephalization and trend of neural evolution in non-chordates.

Defence mechanism in Cnidaria, Insect and Mollusca.

UNIT III

Concept, types of parasites, hosts and parasitism.

Distribution, habit and habitat, structure, life cycle and diseases caused by *Plasmodium* sp. With reference to vaccination, problem and strategies in development of vaccination for malaria.

Morphology and life cycle of insect vectors involved in Leishmaniasis and Trypanosomiasis

UNIT IV

Distribution, habit and habitat, structure and life cycle of economically important helminth parasites of man – *Echinococcus granulosus*, *Hymenolepis nana*, *Schistosoma haematobium*, *Trichinella spiralis*.

General characters, organization and larval forms of Platyhelminthes and Nematelminthes
Zoonosis, host-parasite interaction.

Reading List

Anderson, D.T. (2001) *Invertebrate Zoology*. Oxford University Press.

Bogitish, B.J., Carter, C. E. & Oeltman, T, N, (2012) *Human Parasitology*. Academic Press.

Bush, A.O., Fernandez, J.C., Esch, G.W., & Seed, J.R. (2001) *Parasitism: The diversity and ecology of Animal parasite*. Cambridge University Press.

Chapman, R.F. (2012) *The Insects: Structure and Function*. Cambridge University Press.

Chaterjee, K.D. (2009) *Parasitology: Protozoology & Helminthology*. CBS Publishers & Distributors Private Limited.

Cheng, T.C. (1986) *General Parasitology*. Academic Press.

Gullan, P.J & Crasnoston, P.S. (2010) *The Insects: An Outline of Entomology*. Wiley Blackwell Publisher.

[Hausmann](#), K. & [Hulsmann](#), N. (1996) *Protozoology*. George Thieme Verlag.

Hyman, L.H (1992) *Invertebrates Zoology -Volume I-VII*. International Books & Periodicals Supply Services, Delhi.

Klowden, M.J. (2013) *Physiological system in Insects*. Academic Press.

Smyth, J.D. (1994) *Introduction to Animal Parasitology*. Cambridge University

ZOO 102

BIOCHEMISTRY, CELL BIOLOGY AND GENETICS

UNIT I

Protein structure: Primary and secondary structure (α helix, β pleated sheets and bends);

Ramachandran plot; Tertiary structure: Domains and Motifs; Quaternary structure
Enzyme kinetics: Michelis Menten Equation (MM and LB Plots); Mechanism of enzyme action; concept of enzyme activity, Ribozyme, Abzyme.
Metabolism: concept of metabolic pathway, β oxidation and synthesis of fatty acids.

UNIT II

Chromosomal proteins: Histones and their modifications, Scaffold Matrix protein, nucleosome organization of chromosome.

Cell cycle: cyclin, cyclin dependent kinases; Genetic regulation of meiosis.

Cancer: Tumor types, properties of tumor cells, cancer as a genetic disease, oncogenes, stem cells.

UNIT III

Transcription in Eukaryotes: General transcription factors, capping, splicing, transcription initiation, elongation and termination.

Translation in Eukaryotes: tRNAs, tRNA synthetase, translational initiation, elongation, termination; telomerase and DNA-end replication.

UNIT IV

Gene concept: concept of cistron; Benzer's Experiment and modern view.

Recombination with special reference to site specific recombination- ser/tyr recombination and their mechanism of action.

Gene regulation: Lac Operon, Regulon, Trp Operon.

Reading List

Barberis, A. & Petrascheck, M. (2003) Transcription activity in Eukaryotic cells. Wiley Online Library.

Berg, J.M., Tymoczko, J.L. & Stryer, L. (2002) Biochemistry. W.H.Freeman & Company.

Cooper, G.M. (2009) The Cell: A Molecular Approach. Sinauer Associates, Inc.

De Robertis, E.D.P. (2006) Cell & Molecular Biology. Lippincott Williams and Wilkins.

Franks, L.M. & Teich, N.M. (1997) Introduction to the Cellular & Mol Biology of Cancer. Oxford University Press.

Gardner, A. & Davies, T. (2009) Human Genetics. Scion Publishing Ltd.

Gardner, E.J., Simmons, M.J. & Snustad, D.P. (2000) Principles of Genetics. John Wiley & Sons.

Griffiths, A.J.F. et al. (2010) Introduction to Genetic Analysis. W. H. Freeman Publisher.

Hartwell, L. et al. (2010) Genetics: From Genes to Genomes. McGraw-Hill Science/Engineering/Math.

Karp, G. (2009) Cell & Molecular Biology Concepts and Experiment. Willey Blackwell Publisher.

ZOO 103

ENDOCRINOLOGY, TOOLS AND TECHNIQUES, BIOSYSTEMATICS, BIOSTATISTICS

UNIT I

Vertebrate endocrine system: Concept of Neurosecretion, Neurosecretory centres, Hypothalamus, Pineal and Thymus and their hormones.

Hypophysis: Neurohypophysis and Adenohypophysis, structure, function and hormones

Thyroid Hormone and its function, role in amphibian metamorphosis

Hormones: Molecular mechanism of hormone actions.

UNIT II

Assay: Definition, criteria of reliability.

Principles and uses of analytical instrument – spectrophotometer

Microscopy: General concept, Fluorescence microscopy with special reference to Fluorescence in microscopy.

Separation Technique: Centrifugation, Basic principles of sedimentation, differential and density gradient centrifugation.

Chromatography: Principles of column chromatography – Ion Exchange Chromatography, GLC, HPLC.

UNIT III

Biological species concept, species and supra and infra species categories

Speciation, origin of reproductive isolation, biological mechanism of genetic incompatibility

Classical and molecular taxonomy, phenetics and cladistics

Zoological nomenclature (ICZN), principles, interpretation and application of important rules

UNIT IV

Definition of Biostatistics and utilization in Biological studies, terminologies - variables, populations, data, samples, estimates.

Hypothesis testing and student's "t" test distribution

Probability distribution: concept, binomial and Poisson's distribution

Models: Types of models, statistical, empirical, mechanistic, stochastic, simulation.

Reading List

Balinsky, B.I. (1970) An introduction to embryology, Saunders, New York.

Bargmann, W., Oksche, A., Polenov, A. & Scharrer, B. (1979) Neurosecretion and Neuroendocrine Activity. Springer Link.

Cotterill, R. (2002) Biophysics: An Introduction. Wiley & sons.

Darwin, C. (1858) On the origin of species by means of natural selection. London John Murray.

Das, N.G. (2008) Statistical Method. Vol I. Tata McGraw Hill Education Private Limited.

Gilbert, L. (1981). Metamorphosis: A Problem in Developmental Biology. Springer publisher.

Gilbert, S.F. (2000) Developmental Biology (6th ed). Sinauer Associates Inc., U.S.

Glaser, R. (2004) Biophysics: An introduction. Springer publisher.

Graham, J. (2001) Biological centrifugation. Garland Science (Taylor & Francis).

Hadley, M. & Levine, J.E. (2006) Endocrinology. Benjamin Cummings.

ZOO 104 PRACTICAL

1. Identification with reasons: Paramecium, Plasmodium (Gametocyte, Signet ring, trophozoite stage), Spicules of Porifera/Sycon, Hydra, Obelia (Gastrozooids), Planaria, Dugesia, Ascaris, Wuchereria bancrofti, Hirudo, Neris (Parapodia), Chaetopterus, Macrobrachium, Hippa, Eupagurus, Aplysia, Sepia (Ink gland), Holothuria, Brittle star.

2. Mounting and dissection: Mouth parts of mosquito, housefly, mushroom gland of cockroach, Gregarines, Nyctotherus, Gut Nematode of Toad. **20**
3. Estimation of sugars by Somogyi-Nelson Method, Estimation of saponification values of oils and fats, Estimation of DNA Diphenyl-amine Reaction. **10**
4. Study of Meiotic stages of Grasshopper / Rat testis, Barr body preparation, study of gene frequency in ABO Blood group **10**
5. Problems based on Biostatistics. **15**
6. Submission of five locally available insects. **10**
7. Lab Note Book and Viva-voce **5+10**

Reading List

Ghose, K.C. & Manna, B. (2007) Practical Zoology. New Central Book Agency, Kolkata.

Hegner, R.W. (2007) Practical Zoology. Macmillan.

Krebs, C.J. (1998). Ecological methodology. Benjamin Cummings.

Nakra, B. C. & Chaudhry, K. K. (2010) Instrumentation, measurement and analysis. Tata McGraw Hill Education Private Limited.

Poddar, T.K., Mukhopadhyay, S. & DAs, S.K. (2002) An Advanced Laboratory Manual of Zoology. Macmillan Publishers India Limited.

Srivastava, P. C. & Verma, P. S. (2004) Advanced Practical Zoology. S. Chand & Company, India.