

PRINCIPAL SUBJECT AREA

ZOOLOGY

400 LEVEL COURSES

ZL 401 Taxonomy, Field Sampling and Biostatistics (3 credits)

Use of taxonomic keys for the identification of selected animal groups up to generic and species levels. Methods of sampling different taxa and plant communities; Use of different types of Collecting and Sampling Equipment. Types of biological data, Methods of comparison of Sample Means; Determination of association between variables; One way analysis of variance, Regression and correlation; Diversity indices; Species richness and abundance; Estimation of relative and absolute densities of plant and animal communities.

Practicals based on above.

Recommended Texts:

1. *Ecological Methodology*. C.J. Krebs.
2. *Ecological Diversity and Its Measurements*. A.E. Magurran.
3. *Ecological Census Techniques*. A Handbook. Ed. W.J. Sutherland.

ZL 402 Techniques in Zoology (2 credits)

Microtomy; Slide mounting and Staining of entire specimens, tissues and embryos; Determination of blood parameters; Biochemical tests; Taxidermy and preparation of skeletons; Preservation techniques of soft bodied animals.

Recommended Texts:

1. *General Zoology – Laboratory Guide*. J. E. Woodesdalek.
2. *Microscopic Anatomy of the Rat: A Photographic Atlas*. E.M. Smith.
3. *Taxidermy \step by Step*. W.F. McFall.

ZL 403 Applied Entomology (3 credits)

(Prerequisites: ZL 303)

Insect taxonomy, Classification and Identification of selected taxa. Insect genitalia and their importance; Beneficial insects and Biological control; Chemical methods of pest control; Insecticide resistance and Mechanisms of resistance; Insect ecology, Insect communication; Insect population dynamics and Life tables; Insect conservation.

Practicals based on above.

Recommended Texts:

1. *Agricultural Insect Pests of the Tropics and Their Control*. D.S. Hill.

ZL 404 Applied Parasitology (3 credits)

(Prerequisite: ZL 304)

Taxonomy, morphology, life cycles and geographic distribution of parasitic protozoa and metazoa (selected examples from taxa); Reproduction and larval stages; Parasite behaviour, nutrition and metabolism; genetics of parasites; Geomedical aspects and control of parasitic diseases; Epidemiology of parasitic diseases with special reference to Sri Lanka; Zoonoses; Serology and immunodiagnostic methods (DNA and protein) for parasite identification, Immunity to parasites; Biotechnology in parasitology; Parasitology and websites; Emerging diseases.

Practicals based on above.

Recommended Texts:

1. *General Parasitology*. T. Cheng.
2. *A Functional Biology of Parasitism: Ecological Evolutionary Implications*. G.W.Esch & J.C. Fernandez.
3. *Essentials of Parasitology*. G. Schmidt.

ZL 405 Ecotourism and Nature Conservation (3 Credits)

Types of tourism; Potential for ecotourism: Landscapes (ecosystems), Man-made ecosystems, Cultural background, Biological diversity, Protected Areas, Coral reefs, Elephant orphanage; Ecotourism services: Sources of information, Travel operators, Transport facilities, Hotel and other facilities; Potential for joint ecotourism with nearby countries; Constraints to tourism; Ancillary benefits of ecotourism; Negative impacts of tourism; Improvement of ecotourism facilities.

Recommended Texts:

1. *Tourism, Ecotourism and Protected Areas: The State of Nature-Based Tourism around the World and Guidelines for Its Development*. Ed. H. Ceballos-Lascurdin.
2. *Ecotourism: An Introduction*. D.A. Fennell.
3. *Ecotourism: Sustainable Nature and Conservation Based Tourism*. P.S. Ashton, R.E. Jr Ashton.

ZL 406 Environmental Biology (3 credits)

Adaptation to environment and adapting the environment: Man's position and his impact on earth; Overpopulation and environmental degradation; Worldwide population trends; Atmosphere; Greenhouse effect and Global warming; Ozone depletion; Types, Sources and Effects of air pollution: Acid rain, Photochemical smog; Organic pollution; Carcinogenic and mutagenic effects of chemicals; Pesticides and their problems; Aquatic pollution; Algal toxins; Heavy metal pollution; Thermal pollution; Sound and noise pollution; Biological effects of radiation; Health effects on humans and other animals; Land use; Urbanization; Sewage, Soil and land pollution; Industrial pollution; Introduction to Climatology; El Nino and Southern Oscillation; Earthquakes, volcanism & Tsunamis; Resource development and Environmental Impact Assessment (EIA) in Sri Lanka; Government and environmental policy; International conventions and protocols related to environment. Practicals based on above.

Recommended Texts:

1. *Guidelines for Baseline Ecological Assessment*. Ed Institute of Environmental Assessment.
2. *El Nino and the Southern Oscillation*. Eds H.F. Diaz & V. Markgraf.
3. *Environmental Science with Infotrac: Working with the Earth*. G.T. Miller.

ZL 407 Immunobiology (3 credits)

Structure, function and evolution of immune systems of selected invertebrates and vertebrates; Evolution of immunity, Cells of the immune systems, Anatomic organization of the immune system, Basis and mechanisms of immunity, Antigen recognition and presentation, Heterogeneity and diversity of receptor molecules of immune systems, Mediators of antigen-antibody reactions of immune responses, Regulation of immune responses, Hypersensitivity reactions, Techniques in immunology, Interactive learning using the Internet. Practicals based on above.

Recommended Texts:

1. *Immunobiology: The Immune System in Health and Disease*. C. Janeway & P. Trawers
2. *Techniques in Clinical Immunology*. R.A. Thomas.
3. *Harpers Biochemistry*. R.K. Murray, D.K. Granner, P.A. Mayers & V.W. Rodwell..

ZL 408 Inland Fisheries and Aquaculture (3 credits)

(Prerequisite: ZL 307)

Fisheries of Sri Lanka, its importance, potential, regulation and management, fishing gear and methods of fishing, preservation and processing of food fish, techniques of natural stock enhancements in inland fisheries. General Principles and Economics of Aquaculture: Aquaculture methods and practices, culturable fish and shellfish, construction of fish farms, management of fish farms, fish nutrition, fish diseases, induced breeding and seed fish production, Culture of prawns and shellfish.

Practicals based on above.

Recommended Texts:

1. *A Manual of Freshwater Aquaculture*: R. Santhanam, N. Sukumaran & P. Natarajan.
2. *Aquaculture Systems and Practices: A Selected Review*. E. A. Baluyut.

ZL 409 Limnology and Wetland Ecology (3 credits)

Lakes: Origins and morphometry, Physical factors, Water chemistry, Thermal stratification, Plant nutrients - N and P; Primary productivity; Plankton; Nekton; Benthos; Nutrient enrichment; Use of bioindicators; Acidification; Streams: Stream geomorphology; Rainfall, runoff and infiltration; Sedimentation and sediment transport; primary & secondary productivity; Invertebrates, fish and food webs; Ecology of riparian zones; Flood plains; River continuum concept; Wetland types and classification; World wetland distribution; Water budget and Biological effects; Wetland soils; Soil aeration and development of anaerobic conditions; Effect of salinity and water logging; vegetation, fauna and their adaptations; Wetland creation and restoration; Constructed wetlands for wastewater treatment; Productive coastal ecosystems.
Practicals based on above.

Recommended Texts:

1. *Wetland Ecology: Principles and Conservation*. P.A. Keddy.
2. *Conservation Management of Freshwater Habitats: Lakes, Rivers and Wetlands*. P.S. Maitland & N.C. Morgan.
3. *Aquatic Pollution: An Introductory Text*. E.A. Laws.

ZL 410 Marine Biology and Fisheries (3 credits)

The Ocean as a habitat: circulation, tides and Waves; properties of sea water; Marine habitats and biodiversity; deep sea, open ocean, coastal sea; The intertidal zone; Primary Productivity in the Sea: phytoplankton and macro-algae; Major invertebrate groups; Fishes, reptiles, birds and mammals; Larval Dispersal and Migrations; Coral and other reefs; Human impacts: over-exploitation of marine resources; pollution, introduced marine pests, tourism; Sri Lankan marine flora and fauna; Marine fisheries of the world; Inshore and offshore fishery; Fishing gear; Marine fishery of Sri Lanka; Mariculture of shellfish,
Practicals based on above.

Recommended Texts:

1. *The Effects of Fishing on Marine Ecosystems and Communities*. S.J. Hall.
2. *Marine Pollution*. R.B. Clark.
3. *Marine Biology: An Ecological Approach*. J.W. Nybakken.

ZL 411 Wildlife Management (3 credits)

Population: Growth and Regulation; Carrying capacity; competition; Sustainable Yield Harvesting; Vertebrate Pest Control; Management of threatened Wildlife; Wildlife and Society; Minimum Viable Population; Island Biogeography; *in-situ* and *ex-situ* conservation; Extinction; International Conventions.
Field work.

Recommended Texts:

1. *Wildlife Ecology and Management*. W.L. Robinson E.G. Bolen.
2. *Wildlife Ecology and Management*. G. Caughley & A.R.E. Sinclair.

ZL 412 Biodiversity & Conservation Biology (3 credits)

Ecosystem- and genetic diversity; Global patterns and Values of biodiversity; Effective population size, Inbreeding and Gene flow; Overexploitation; Demography and Extinction processes, Population viability analysis; Endangered species and their protection; Exotic introductions and Invasive species; Ecosystem degradation, Habitat fragmentation and Edge effects; Habitat pollution; Modified ecosystems, Ecosystems management and Restoring ecosystems; Protected areas; Captive breeding and reintroduction; Zoos and Gardens; Human population growth ; Human impact; Sustainable development; Law and politics; Social factors in conservation; Economics of conservation; Conservation politics.

Recommended Texts:

1. *Principles of Conservation Biology*. G.K. Meffe & C.R. Carroll. 1997.
2. *A Primer of Conservation Biology*. R.B. Primack
3. *Global Biodiversity Assessment*. ed. V.H. Heywood.

ZL 413 Molecular Entomology (2 credits)

(Prerequisites: ZL303, MB226)

(Same as MB 431)

Genome organization of insects; Sex determination in insects; Molecular systematics, evolution and genetics of insect populations; Developmental biology and Gene manipulation in insects; Molecular genetics of insect behaviour; Molecular biology of vector-parasite/virus interactions, and of midgut, haemolymph, and salivary gland targets for disruption of pathogen transmission; Up-regulation of specific genes as a response to the development of pathogens, Molecular targets of pesticides and Molecular basis of resistance development; transgenic insects for agricultural pest management and disease vector control.

Recommended Texts:

1. *Insect Molecular Genetics*. M.A. Hoy. Academic Press. 2003.
2. *Molecular Biology of the Gene*. J.D. Watson, N.H. Hopkins, J.W. Roberts, J.A. Steitz & A.M. Weiner. Benjamin/Cummings Publishing Co. 1987.
3. *The Insects*. P.J. Gullen & P.S. Cranston. Blackwell. 2005.

ZL 421 Scientific Writing and Presentation (2 credits)

Writing Scientific Papers and Project Proposals; Organization and Content; Guidelines for writing under different headings; Scientific presentations; Guidelines for preparation of presentations; Effective use of visual aids; Delivery and presentation style.

ZL 422 Essays (2 credits)

Three essays on assigned topics in Zoology should be written by the students.

ZL 431 Seminars (2 credits)

Seminars on assigned topics in Zoology should be presented after due preparation and literature survey by the students.

ZL 491 Research Project (6 credits)

A research project on a given zoological topic shall be carried out under the supervision of staff members. The student is expected to write the Research Proposal and present it, carry out a literature survey and, on completion of the project, make an oral presentation of the work and submit a written report.