

Syllabus for Ph.D. Programme
Department of Zoology, University of Kashmir

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Paper I: Research Methodology – Parasitology

Max. Marks: 100

Time allowed: 3 hours

Min. Marks: 50

Unit I: Parasitological Techniques

Light and Electron Microscopy; Microtomy; Micrometry and Photo Micrography; Fixatives with methods of fixation, preservation and staining techniques, Faecal, blood and urine examinations for diagnosis of parasitic diseases

Unit II: Scientific Writing

Research, Types and Formulations; Meaning of Research, Objective of Research, Motivation in Research; Research methods vs Methodology. Types of research – Descriptive vs Analytical, Applied vs Fundamental, Quantitative vs Qualitative, Conceptual vs Empirical; Research Process, Criteria of good Research, Formulating the research problem; Selecting the problem; Importance of literature review in research; Sources of Literature Review- primary and secondary sources, reviews, treatise, monographs, patents, journals, books and internet resources; Identifying research gap areas from literature review. Hypothesis, important considerations while making a hypothesis.

Unit III: Research Ethics

Ethics in Research Introduction to Bioethics, Ethical issues concerning various fields of biology; Embryonic stem cells and cloning, gene therapy and designer babies, genetically modified animals and crops. Ethical limits of animal use and welfare; Medical research ethics, Plagiarism and academic integrity; Mentor and mentee responsibilities and relationships, Record keeping, data, responsible authorship and Publications, Conflict of interest

Unit IV: Bio-Statistics

Method of data collection and presentation of data; Measures of central tendencies and dispersion; Correlation and regression analysis; Types of errors in testing hypothesis, level of significance, p-value, tests of significance (T-test, F-test, chi square test and non-parametric test (one & two sample) Analysis of variance (ANOVA)- one way and two way; Probability and probability distribution – Normal, Binomial and Poisson.

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Paper I: Research Methodology – Ichthyology

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Unit I: Fish Biology and Biochemistry

Methods used for estimation of Physico-Chemical parameters in waterbodies: Dissolved Oxygen, Free CO₂, transparency, total alkalinity, pH Nitrite, nitrate and phosphorous. Estimation of Fish diversity, age, fecundity, Collection, prevalence and estimation of zooplankton in water body; Methods used in determination of moisture, protein, fat, ash and hematological parameters (Hb, RBC, PCV, WBC, ESR and Erythrocyte indices)

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Paper I: Research Methodology – Wildlife

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Unit I: Field Methods

Sampling design and data collection, Vegetation sampling methods for wildlife habitat evaluation, Methods of wildlife population estimation: sample counts, drive counts, line transect method, point counts, pugmark census, pellet group count and counts of dens and burrows; Recording basic field observations through field signs like foot prints, feeding signs and animal droppings; Capture of wild animals; Use of camera, binoculars and GPS in Wildlife study; Quantitative methods of sampling behaviour : ad libitum, focal animal and scan sampling; Time-activity budgets, ethograms; Faecal analysis for evaluation of food and feeding in ungulates and carnivores

Unit II: Scientific Writing

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Paper I: Research Methodology – Entomology

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Unit I: Collection, Preservation and rearing of Insects

Methods of collection and preservation of insects; Insect mounting techniques – temporary and permanent; Methods of insect rearing, Management and maintenance of insectaries; Chemical composition of various mountants and fixatives, Methods for preparation of cleansing agents, Berle's mountant Bio-chemical composition of various preservatives.

Unit II: Scientific Writing

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Unit III: Unit III: Research Ethics

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Paper II: Recent Advances in Zoology

Max. Marks: 100

Time allowed: 3 hours

Min. Marks: 50

Unit I: Advanced Trends in Applied Zoology

- 1.1 Latest techniques in Fish- cultures & its products
- 1.2 Parasites & predators as biocontrol agents of pests
- 1.3 Conservation of Biodiversity; in-situ and ex-situ
- 1.4 Recent advancements in the diagnosis and control of parasitic diseases
(Protozoan and Helminth)

Unit II: Nanotechnology, Recombinant DNA Technology & Advanced Genetics

- 2.1 Introduction to Nanotechnology and its applications in animal science
- 2.2 Production of monoclonal antibodies, biomolecules and hormones through rDNA technology
- 2.3 DNA forensics: DNA profiling methods, technical and ethical issues of DNA profiling
- 2.4 Epigenetics: epigenetic alterations to the genome, epigenetics and imprinting, epigenetics and cancer

Unit III: Recent Techniques in Zoology

- 3.1 PCR and blotting techniques, DNA fingerprinting and its applications
- 3.2 Phylogenetic systematics – molecular markers used in the diagnosis of taxa
- 3.3 Centrifugation, electrophoresis and their applications
- 3.4 Application of remote sensing in animal sciences

Unit IV: Latest Advances in Immunology

- 4.1 Hypersensitivity: mechanism & types of reactions
- 4.2 Autoimmune diseases: causes and control
- 4.3 Tumour immunology: host immune response to tumours & tumour escape mechanisms
- 4.4 Tumour immune therapy: non-Specific and antigen specific treatment

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Paper III: Specialized Paper

Max. Marks: 100 Time allowed: 3 hours

Min. Marks: 50

Specialized Paper The syllabus for this paper shall be based on recent developments in the area of research and will be drafted by the concerned supervisor and approved by the DRC.