**Semester I**

**Name of the Programme:** M.Sc. Zoology

**Course Code:** ZOO–500 **Title of the Course:** Principles of Animal Systematics

**Number of Credits:** 3

**Effective from AY:** 2023-24

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| **Pre-requisites for the Course:** | Basic working knowledge of classical and animal taxonomy and systematics. | |
| **Course Objectives:** | 1. To introduce concepts in animal taxonomy and systematics and their applications.<br>2. To provide knowledge and means for characterizing and classifying animals based traditional and molecular techniques<br>3. To assess the ecology and biogeographic distribution of organisms based on evolutionary patterns<br>4. To establish the importance of traditional and modern trends in taxonomy and research | |
| **Content:** | **Module 1**<br>Introduction, stages, importance of taxonomy, advances in taxonomy.<br>Principles, rules and new trends in taxonomy; zoological nomenclature, ICZN regulations, zoological classification, problems faced by taxonomists.<br>Taxonomic collections, identification and description, taxonomical hierarchy (Linnaean hierarchy), concepts of taxon, holotype, paratype, topotype etc.<br>Concept of speciation: biological, phylogenetic and evolutionary. | 15 Hours |
| | **Module 2**<br>Morphology based taxonomy, Numerical and Immuno-taxonomy, Paleotaxonomy, Cyto-taxonomy and Chemotaxonomy.<br>Molecular basis of animal taxonomy, genetic polymorphism, electrophoretic variations, amino acid sequencing of proteins, DNA-DNA hybridization.<br>Systematics - definition and role in biology, biological classification, molecular systematics, DNA fingerprinting and molecular markers for detection/evaluation of polymorphism, RFLP, RAPD, etc. | 15 Hours |

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| | **Module 3**<br>Phylogenetics: introduction; basic terminology, homology and analogy: divergence, convergence, parallelisms and reversals; vicariance.<br>Phylogenetic groups: monophyly, polyphyly, paraphyly.<br>Construction of phylogenetic trees, by using cladistic and phenetic methods. Cladistics and cladogram: Parsimony and finding the shortest trees, rooting trees.<br>Molecular divergence, molecular clock, molecular drive. | 15 Hours |
| **Pedagogy:** | Lectures/ tutorials/online teaching mode/self-study and discussions | |
| **References/ Readings:** | 1. J.C. Avise, Molecular Markers, Natural History and Evolution, New York: Chapman & Hall, 2004.<br>2. A.M. Huston, Biological Diversity, Cambridge: Cambridge University Press, 1994.<br>3. V.C. Kapoor, Theory and Practice of Animal Taxonomy, Oxford & IBH Publishing Co. 1983.<br>4. M. Kato, The Biology of Biodiversity, Springer, 2000.<br>5. E. Mayer, Elements of Taxonomy, Oxford IBH Publishing company, 1971.<br>6. G.G. Simpson, Principles of animal taxonomy, Scientific Publishers, 2012.<br>7. B.K. Tikader, Threatened Animals of India, Calcutta: ZSI publication, 1983.<br>8. E.O. Wilson, Biodiversity, Washington: Academic Press, 1988.<br>9. E.O. Wilson, The diversity of Life, The College edition W.W. Northem & Co., 1992. | |
| **Course Outcomes:** | The learner will<br>1. Discuss the historical and modern methods of animal classification and systematics.<br>2. Classify organisms by using keys and field techniques.<br>3. Compare traditional and molecular techniques in animal taxonomy.<br>4. Validate the use of traditional and modern techniques in animal taxonomy and biogeography. | |

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