

**ANIMAL TAXONOMY, SYSTEMATICS & BIostatISTICS****Code: ZLG4400104; Credit: 3 (T) + 1 (P)****THEORY**

| <b>Units</b>              | <b>Theory</b>  | <b>Allotted faculty</b> |
|---------------------------|--|-------------------------|
| 1<br>(Animal Systematics) | <p>Introduction to Systematics -Taxonomy vs Systematics; Taxon and Phenon; Contribution of Systematics to biology; Systematics as a profession, Taxonomic categories; concepts of species – typological, nominalistic, biological and evolutionary; Taxonomic keys – various types; dichotomous nature of keys; Taxonomic characters – morphological, behavioural, ecological, and geographical; Trends in taxonomy – chemotaxonomy, cytotaxonomy and molecular taxonomy;</p> <p>Zoological Nomenclature – ICZN, Principles, functions, and importance of The Code of nomenclature; principle of priority, homonymy and synonymy, principle of typification and use of types for specimens</p> <p>Basics of phylogeny – Characters (ancestral vs. derived), homology and analogy, parallelism and convergence, monophyly, polyphyly, paraphyly; representing phylogenies – Rooted and unrooted phylogenetic trees; clades; Cladograms and Phenograms</p> | NKD                     |
| 2<br>(Biostatistics)      | <p>Concept, Importance and Application of Biostatistics</p> <p>Collection and Classification of Statistical data, Frequency distribution, Types of presentation of Statistical data</p> <p>Measures of Central tendency - Mathematical average, Average of position Measures of Partition values;</p> <p>Measures of Dispersion - Range, Quartile deviation, Mean deviation; Standard deviation, Co-efficient of Variation, Standard errors; Testing of Hypothesis; Confidence Intervals; Chi-square test, student's t-test, Analysis of variance.</p> <p>Correlation and Regression</p>   | DD, RL                  |

**PRACTICAL**

| <b>Experiments</b>   | <b>Allotted faculty</b> |
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| 1. To identify and distinguish species of insects/ fishes/amphibians/ reptiles/ birds of NE India using appropriate taxonomic keys.<br>2. Morphometry and meristic study of insect and fish.<br>3. Preparation and study of skeleton of fish.<br>4. Graphical representation of statistical data with the help of computer (e.g., MS-Excel). | NKD                     |
| 5. Calculation of two-sample t-test for a given set of data.<br>6. Calculation of F value (ANOVA) for a given set of data.<br>7. Calculation of Karl Pearson's Coefficient of Correlation for a given set of data.   | RL<br>DD & RL<br>DD     |
| 8. Field visit to any Natural History Museum/ Zoo.   | RL, DD & NKD            |

**Suggested Readings:**

1. Kapoor, V.C. (2019). Theory and Practice of Animal Taxonomy, 8th Edition, Oxford & IBH Publishing.
2. Simpson, G.G. (2012). Principles of Animal Taxonomy, Scientific Publishers (Indian Edition)
3. Mayr, E. (2022). Principles of Systematic Zoology, United Book Prints (Indian Edition)
4. Wiley, E. O. & Lieberman, B. S. (2011). Phylogenetics: Theory and Practice of Phylogenetic Systematics, Wiley Blackwell
5. Zar, J. H. (1999). Biostatistical Analysis, IV Edition, Pearson Education Inc and Dorling Kindersley Publishing Inc.USA.
6. Antonisamy, B., Christopher S. & Samuel, P. P. (2010). Biostatistics: Principles and Practice. Tata McGraw Hill Education Private Limited, India.
7. Pagana, M. & Gavreau, K. (2000). Principles of Biostatistics, Duxberry Press, USA

**ANIMAL PHYSIOLOGY AND ENDOCRINOLOGY****Code: ZLG4400204****Credit: 3 (T) + 1 (P)****THEORY**

| <b>Units</b>  | <b>Theory</b>   | <b>Allotted faculty</b> |
|---|---|-------------------------|
| 1<br>(Tissues,<br>Functioning of<br>Excitable<br>Tissue (Nerve<br>and Muscle),<br>Digestion and<br>Absorption of<br>Food) | Types of Tissues; Structure and Function of Epithelial, Connective, Muscular and Nervous Tissues, Generation of Nerve Impulsion and Propagation, Synaptic Transmission and Neurotransmitters.<br>Structure, Kinds and Characteristics of Muscles, Mechanism of Muscle Stimulation and Contraction Neuro - Muscular Junction.<br>Patterns of Digestion and Absorption in Animals, Role of Digestive Enzymes, Digestion, Absorption and Assimilation of Various Food Stuffs | NKD                     |
| 2<br>(Respiratory<br>Physiology,<br>Cardiovascular<br>System and<br>Renal<br>Physiology)                                  | Respiratory Organs in Different Animals, Transport of Oxygen and Carbon dioxide, Respiratory Pigments.<br>Types and structure of heart, Concepts of Neurogenic and Myogenic Hearts, Cardiac cycle, ECG patterns in Human.<br>Homeostasis and Blood Clot Formation.<br>Functions of Kidney, Types of Nitrogenous Wastes in Different Animal Groups and their Excretion; Urea production – Hans Krebs and Kurt Henseleit cycle, Urine Formation.                            | DD                      |
| 3<br>(Pituitary,<br>Thyroid,<br>Pancreas and<br>Adrenal<br>Glands)  | Structural organization, Hormone secretion and its functions.<br>Pituitary gland and its hypothalamic control.<br>Thyroid and Parathyroid Gland-Structure, function and mechanism of action, Structure of pancreas, Pancreatic hormones, their functions and mechanism of action,<br>Dysfunction and disease of pancreatic hormones, Structural Organizations of Adrenals, Functions of Cortical and Medullary Hormones and mechanism of action.                          | RL                      |

**PRACTICAL**

| <b>Experiments</b>  | <b>Allotted Faculty</b> |
|---|-------------------------|
| 1. Preparation of temporary mount of blood cells (blood film) | NKD                     |

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| preparation), squamous epithelium and striated muscle fibres.<br>2. Preparation of haemin and haemochromogen crystals.   |             |
| 3. Haemoglobin estimation using Sahli's haemoglobinometer.<br>4. Determination of ABO Blood group and Rh factor.   | RL          |
| 5. Study of TLC and DLC in mammalian blood.<br>6. Study of sickle cell anaemia in human using photomicrograph.   | DD          |
| 7. Examination and detailed study of permanent histological sections of mammalian Stomach, Duodenum, Liver, Lung, Kidney, Pancreas, Adrenal, Pituitary, Thyroid and Parathyroid. | NKD, RL, DD |

**Suggested Readings:**

1. Tortora, G.J. and Derrickson, B.H. (2012). Principles of Anatomy and Physiology. XIIIth Edition, John Wiley and Sons, Inc.
2. Hill, R. (2021) Animal Physiology. Sinauer Associates Inc; 5th edition.
3. Widmaier E, Raff H and Strang K. (2013). Vander's Human Physiology: The Mechanism of Body Functions. XIIIth Edition, McGraw-Hill Education.
4. Guyton, A.C. and Hall, J.E. (2011) Textbook of Medical Physiology. XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company.
5. Kesar, S. and Vashisht, N. (2007) Experimental Physiology. Heritage Publishers.
6. Prakash, G. (2012) Lab Manual on Blood Analysis and Medical Diagnostics. S. Chand and Company Ltd
7. Cinnamon, V., Regan J., Russo A.F. (2022) Seelay's Anatomy and Physiology. McGraw Hill Education.

**FUNDAMENTALS OF ECOLOGY****Code: ZLG4400304****Credit: 3 (T) + 1 (P)****TO BE ADOPTED FROM SWAYAM**

By Prof. Vishwesh Guttal, Prof. Kavita Isvaran, Prof. Kartik Shanker, Prof. Umesh Srinivasan, Prof. Maria Thaker, Prof. Saskya van Nouhuys; IISc Bangalore

**THEORY**

| <b>Theory</b>  | <b>Allotted faculty</b> |
|--|-------------------------|
| Week 1: Introduction, Sensory Ecology, and Resource Acquisition<br>Week 2: Movement, Anti-predator and Social Behaviours<br>Week 3: Population Growth and Dynamics<br>Week 4: Population Dynamics and Spatial Structure                                  | RL                      |
| Week 5: Study Design and Quantitative Thinking<br>Week 6: Community Ecology: Introduction, Niche and Community Assembly<br>Week 7: Community Ecology: Species Interactions<br>Week 8: Community Ecology: Food webs and Species Invasion                  | NKD                     |
| Week 9: Community Ecology: Species Diversity and its Estimation<br>Week 10: Community Ecology: Macroecology and Biogeography<br>Week 11: Ecosystems and Bio-geochemical Cycles<br>Week 12: Anthropogenic Environmental Changes & Synthesis of the course | DD                      |

**PRACTICAL**

| <b>Experiments</b>  | <b>Allotted faculty</b> |
|---|-------------------------|
| 1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided   | DD                      |
| 2. Determination of population density by quadrat method and calculation of Shannon-Weiner diversity index in a natural/hypothetical community.   | RL                      |
| 3. Study of an aquatic ecosystem: phytoplankton and zooplankton, measurement of temperature, turbidity/penetration of light, determination of pH, and dissolved oxygen content (Winkler's | NKD                     |

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| method), free CO <sub>2</sub>  |             |
| 4. Report on a visit to National Park/Biodiversity Park/Wildlife sanctuary | DD, NKD, RL |

**Suggested Readings:**

1. Colinvaux, P.A. (1973). Ecology. 2nd Edition. John Wiley and Sons Inc.
2. Krebs, C. J. (2001). Ecology. 6th Edition. Benjamin Cummings.
3. Odum, E.P. (2008). Fundamentals of Ecology. Indian Edition. Brooks/Cole
4. Smith, R. L., Smith, T.M. (2000). Ecology and field biology Harper and Row publisher
5. Ricklefs, R.E. (2000). Ecology. V Edition. Chiron Pres

**PARASITOLOGY****Code: ZLG4400604 (DSE-III)****Credit: 3 (T) + 1 (P)**

| Units | Theory   | Allotted faculty |
|-------|--|------------------|
| 1     | Brief introduction of Parasitism; Parasite, Parasitoid and Vectors; Host-parasite relationship; types of parasites and hosts; evolution of parasitism<br>Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of <i>Trypanosoma gambiense</i> , <i>Leishmania donovani</i> and <i>Plasmodium vivax</i>                 | DD               |
| 2     | Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of <i>Schistosoma haematobium</i> , <i>Taenia solium</i> and <i>Hymenolepis nana</i> . Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity of <i>Ancylostoma duodenale</i> , and <i>Trichinella spiralis</i>                                 | RL               |
| 3     | Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity of <i>Ascaris lumbricoides</i> , and <i>Wuchereria bancrofti</i> .<br>Biology, importance and control of ticks, mites, <i>Pediculus humanus</i> (Head and Body louse), <i>Xenopsylla cheopis</i> and <i>Cimex lectularius</i><br><br>A brief account of parasitic vertebrates – Candiru and Vampire bat | NKD              |

**PRACTICAL**

| Experiments   | Allotted faculty |
|---|------------------|
| 1. Study of life stages of <i>Entamoeba histolytica</i> , <i>Giardia intestinalis</i> , <i>Trypanosoma gambiense</i> , <i>Leishmania donovani</i> and <i>Plasmodium vivax</i> through permanent slides/photographs. | RL               |

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| 2. Study of adult and life stages of <i>Fasciolopsis hepatica</i> , <i>Schistosoma haematobium</i> , <i>Taenia solium</i> and <i>Hymenolepis nana</i> through permanent slides/photographs.  |     |
| 3. Study of adult and life stages of <i>Ascaris lumbricoides</i> , <i>Ancylostoma duodenale</i> , <i>Wuchereria bancrofti</i> and <i>Trichinella spiralis</i> through permanent slides/microphotographs.<br>4. Study and preparation of report of any two common protozoan/helminth/ arthropod parasites | DD  |
| 5. Study of <i>Pediculus humanus</i> (Head louse and Body louse), <i>Xenopsylla cheopis</i> and <i>Cimex lectularius</i> through permanent slides/ photographs.<br>6. Study of nematode/cestode parasites from fish or intestine of Poultry bird   | NKD |
| 7. Submission of at least two arthropod parasites.   |     |

**Suggested readings:**

1. Chernin, J. (2000). Parasitology. Taylor & Francis Group.
2. Arora, D. R and Arora, B. B. (2018) Medical Parasitology. 5<sup>th</sup> Edition, CBS Publications and Distributors Pvt Ltd
3. Noble, E.R. and Noble, G.A. (1982) Parasitology: The Biology of Animal Parasites. 5<sup>th</sup> Edition, Lea & Febiger
4. Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease. Taylor and Francis Group
5. Taylor, M. A., Coop, R. L., & Wall, R. L. (2016). Veterinary Parasitology. 4<sup>th</sup> edition, Wiley Blackwell
6. Loker, E. S. & Hofkin, B. V. (2015). Parasitology – A conceptual approach. Taylor & Francis Group