

Biosystematics, Taxonomy and evolution

ZOO101

UNIT-I

Definition and basic concepts of biosystematics taxonomy and classification. - History of Classification

Trends in biosystematics: Chemotaxonomy cytotaxonomy and molecular taxonomy, Dimensions of speciation and taxonomic characters.

Species concepts species category:- different species concepts subspecies and other infra-specific categories. Theories of biological classification: hierarchy of categories.

UNIT-II

Taxonomic Characters — Different kinds.

Origin of reproductive isolation, biological mechanism of genetic incompatibility. Taxonomic procedures: Taxonomic collections, preservation, curation, process of identification.

Taxonomic keys, different types of keys, their merits and demerits.

International code of Zoological Nomenclature (ICZN): Operative principles, interpretation and application of important rules: Formation of Scientific names of various Taxa.

UNIT-III

Taxonomic categories.

Evaluation of biodiversity indices.

Evaluation of Shannon — Weiner Index.

Evaluation of Dominance Index.

Similarity and Dissimilarity Index.

UNIT-IV

Concepts of evolution and theories of organic evolution.

Neo Darwinism and population genetics:

A- Hardy-Weinberg law of genetic equilibrium.

B- A detailed account of destabilizing forces:

i- Natural selection

ii- Mutation

iii- Genetic Drift

iv- Migration

v- Meiotic Drive.

vi- Trends in Evolution

vii- Molecular Evolution

a) Gene evolution

b) Evolution of gene families

c) Assessment of molecular variation

UNIT-V Origin of higher categories

Phylogenetic — gradualism and punctuated equilibrium. —

Major trends in the origin of higher categories —

Micro and macro evolution.

Molecular population genetics —

Pattern of changes in nucleotide and amino acid sequence. —

Ecological significance of molecular variations (genetic polymorphism)

Genetic & Speciation —

Phylogenetic and biological concept of species. —

Patterns and mechanism of reproductive isolation.

Modes of speciation (allopatry & sympatry) —

Origin and Evolution & Economically important microorganisms and animals.

STRUCTURE AND FUNCTION OF INVERTEBRATES
ZOO102

UNIT-I

1. Origin of metazoa
2. Organization of Coelom
 - A. Acoelomates
 - B. Pseudocoelomates
 - C. Coelomates
3. Locomotion.
 - A. Amoeboid, flagellar and ciliary movement in protozoa
 - B. Hydrostatic movement in Coelenterata
 - C. Annelida and Echinodermata

UNIT-II

A. NUTRITION AND DIGESTION- Patterns of Feeding and digestion in lower metazoa, Mollusca, echinodermata Filter feeding in polychaeta.

B: Respiration - Organs of respiration : Gills, lungs and trachea, respiratory pigments. Mechanism of respiration.

UNIT-III

EXCRETION

Excretion in lower invertebrates.

Excretion in higher invertebrates.

Mechanism of Osmoregulation..

UNIT-IV

NERVOUS SYSTEM.

A. Primitive Nervous systems-Coelenterata and Echinodermata.

B. Advanced nervous system in Annelida, Arthropoda (Crustacea and Insecta) and Mollusca (Cephalopoda)

UNIT-V

A. INVERTEBRATES LARVAL FORMS AND THEIR EVOLUTIONARY SIGNIFICANCE. Trematoda and Cestoda

A, Larval forms of Crustacea

B. Larval forms of Mollusca

C. Larval forms of Echinodermata.

B. 1. Structure affinities and life history of the following minor noncoelomate Phyla –

A. Rotifera

B. Entoprocta

2. Structure affinities and life history of the following minor Phyla

A. Phortmida

B. Ectoprocta

Suggested Readings:

1. Hyman, L.H. The invertebrates, Nol. I.protozoa through Ctenophora, McGraw Hill Co., New York
2. Barrington, E.J.W. Invertebrate structure and function. Thomas Nelson anmd Sons Ltd., London.
3. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London.
4. Hyman, L.H. The Invertebrates. Vol. 2. McGraw Hill Co., New York.

Quantitative biology, biodiversity and wildlife
ZOO103

UNIT-I

Quantitative biology –
Basic mathematics for biologists –
matrices and vectors –
Exponential functions –
Differential equations integration –
Periodic functions –
Probability distribution properties and probability theory

UNIT-II

Experimental designing and sampling theory
Completely randomized design and randomized block design
Analysis of variance
Co-relation- types of correlation
Karl persons coefficient correlation
Regression

UNIT-III

Biodiversity –
Concept and principal of biodiversity –
Causes for the loss of biodiversity
Biodiversity conservation method –
Medicinal uses of forest plant

UNIT-IV

Wildlife of India, types of wildlife –
Values of wildlife positive and negative –
Wildlife protection Act –
Conservation of wildlife in India –
Endangered and threatened species

UNIT-V

Wildlife and conservation
National Parks and Sanctuaries.
Project Tiger, Project Gir lion and Crocodile breeding project

wildlife in M.P. with references to Reptiles Birds and mammals
Biospheres reserves

Suggested Readings:

1. Bataschelet. E. Introduction to mathematics for site scientist springer-verlag, berling Jorgenserr, S.E. Fundamental of Ecological modling E. sevier New York –
2. Lenderen D. Modelling in behavioral ecology. Chapman & Hall London U.K. - Sokal, R.R. and F. J. Rohit Biometry Freeman San Francisco - Snedecor, G.W. and W.G. colhran, statical methods, Affilited East, West Press New Delhi (Indian ed.)

BIOMOLECULES AND STRUCTURAL BIOLOGY
ZOO104

UNIT-I

Chemical Foundation of biology

PH, PK, acids bases, buffers, weak bonds

Free energy, resonance, isomerisation

Acid soluble pool of living tissues — aminoacids, monosaccharides, oligosaccharides, nucleotides, peptides.

Nanoparticles

Biomaterials

UNIT-II

1. Primary, Secondary, tertiary and quaternary structures of proteins, protein folding and denaturation
2. DNA & RNA: Double helical structure of DNA, Structure of RNA, role of RNA in gene expression
3. DNA replication, recombination and repair
4. Functional importance of lipid storage and membrane lipids
5. Membrane channels and pumps

UNIT-III

Biodiversity –

1. Basic concepts of metabolism: Coupled and interconnecting reactions of metabolism cellular energy resources and ATP synthesis
2. Glycolysis and gluconeogenesis
3. Citric acid cycle .
4. Oxidative phosphorylation : Protein and its regulation
5. Fatty acid metabolism: Synthesis and degradation of fatty acids

UNIT-IV

1. RNA synthesis and splicing
2. Biosynthesis of amino acids
3. Biosynthesis of nucleotides
4. Biosynthesis of membrane lipids and steroids
5. Protein synthesis

UNIT-V

1. Enzymes: Terminologies, classification and basics of enzyme kinetics
2. Mechanism of enzyme catalysis

3. Regulation of enzyme action
4. Concept of free energy and thermodynamic principals in biology
5. Energy rich bonds, compound and biological energy transducers

Suggested Readings:

1. Voet, D. and LG. Wet, biocherniAry John Wiley & Sons.
 2. Freifelder, D. Physical Biochemistry W.H. Freeman &Co.
 3. Segal, I.H. Biochemical calculations John Wiley and Sons
 4. Creighton, T.E. Protein Structure and Molecular Properties W.H. Freeman & Co
- U.K. - Sokal, R.R. and F. J. Rohit Biometry Freeman San Francisco - Snedecor, G.W. and W.G. colhran, statical methods, Affilited East, West Press New Delhi (Indian ed.)