

### COURSEWISE SCHEME

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|--------------------------------|------------------------------------|
| 1. Course Code : 627           | 5. Optional Subject : 0            |
| 2. Course Name : M.Sc. Zoology | 6. Maximum marks : 500             |
| 3. Total Subject : 4           | 7. Minimum Passing percentage : 36 |
| 4. Compulsory Subject : 4      |                                    |

Sub. code	Subject Name	Theory								Practical		Total		
		Paper					CCE		Total Marks		Max.	Min.	Max.	Min.
		1st	2nd	3rd	Max.	Min.	Max.	Min.	Max.	Min.				
<b>Compulsory</b>														
577	Biosystematics, Taxonomy & Evolution	85	0	0	85	13	15	5	100	36	0	0	100	36
578	Structure & Function of Invertebrates	85	0	0	85	13	15	5	100	36	0	0	100	36
579	Quantitative Biology, Biodiversity and Wild Life	85	0	0	85	13	15	5	100	36	0	0	100	36
580	Bio Molecules & Structural Biology	85	0	0	85	13	15	5	100	36	0	0	100	36
581	Practical-I Related to Theory Paper I & II	0	0	0	0	0	0	0	0	0	50	18	50	18
582	Practical-II Related to Theory Paper III & IV	0	0	0	0	0	0	0	0	0	50	18	50	18



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Semester wise Syllabus for Postgraduates  
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M.Sc. Zoology  
Semester I  
Paper I

Biosystematics, Taxonomy and evolution

MM-85

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 ,cureting, 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.
  - Trends in Evolution
  - 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.



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**MSc Previous  
Subject: Zoology  
SEMESTER -I  
Paper-I List of Books**

**SUGGESTED READING MATERIAL**

1. M. Koto-The. Biology of biodiversity-Springer
2. E.O. Wilson-Biodiversity-Academic Press Washington.
3. G.G.-Simpson-Principle of animal taxonomy Oxford IBH Publication company.
4. E-Mayer-Elements of Taxonomy
5. Bastchelet-F-Introduction to mathematics for life scientists Springer Verlag, Berling.
6. Skoal R.R. and F.J.Rohiff Biometry-Freeman, San-Francisco.
7. Snecdor, G.W. and W.G. Cocharan Statisical Methods of affiliated-East- West Press, New Delhi.
8. Murry J.D. Mathematical Biology-Springer, Verlag, Berlin.



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~~Section 100001~~

**M.Sc. Zoology**  
**SEMESTER FIRST**  
**Paper II**

**STRUCTURE AND FUNCTION OF INVERTEBRATES**

**Max. Mark- 65**

**UNIT -I**

1. Origin of metazoa
2. Organization of Coelom
  - A. Acocelomates
  - 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, Chelicerata 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 Mollusa (Cephalopoda)

## UNIT - V

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

- A. Larval forms of Crustacea
- B. Larval forms of Mollusea
- 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. Phoronida
- B. Ectoprocta

### SUGGESTED READING MATERIAL -

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 and 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.
5. Hyman, L.H. The Invertebrates. Vol. 8. McGraw Hill Co., New York and London.
6. Barnes, R.D. Invertebrates Zoology, III edition. W.B. Saunders Co. Philadelphia.
7. Russel-Hunter, W.D. A biology of higher invertebrates, the Macmillan Co. Ltd., London.
8. Hyman, L.H. The Invertebrates smaller coelomate groups, Vol. V. McGraw Hill Co., New York.
9. Read, C.P. Animal Parasitism. Parasitism. prentice Hall Inc., New Jersey.
10. Sedgwick, A.A. Student text book of Zoology. Vol. I, II and III. Central Book Depot, Allahabad.



11. Parker, T.J., Haswell W.A. Text book of Zoology, Macmillan Co., London.  
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~~SECRET - 1985-89~~

**M.Sc. Zoology**  
**SEMESTER FIRST**  
**Paper - III**

**Quantitative biology, biodiversity and wildlife**

MM - 85

**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 Pearson's coefficient correlation
- Regression

**Unit - III Biodiversity**

- concept and principle 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 MATERIALS**

- Bataschelet. E. Introduction to mathematics for site scientist springer-verlag, berling
- Jorgenserr, S.E. Fundamental of Ecological modeling E. sevier New York
- 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. Cochran, statistical methods, Affiliated East, West Press New Delhi (Indian ed.)
- Muray, J.D. Mathematical Biology, Springer Verlag Berlin
- Pelon, E.C. The interpretation of ecological data : A primer on classification and ordination.
- A. Lewis – Biostatistics
- B.K. Mahajan Methods in Biostatistics
- V.B. Saharia wildlife in India
- S.K. Tiwari wildlife in central India
- J.D. Murrey Mathematical Biology
- Georgrs & Wilians Statistical method
- R.K. Tondon Biodiversity Taxonomy & Ecology
- M.P. Arora An Introduction to Prevalentology
- P.C. Kotwal Biodiversity and conservation



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**M.Sc. Zoology**  
**Ist Semester**

**Suggested reading materials:**

1. M. Koto : The Biology of Biodiversity. Springer.
2. E. O. Wildon : Biodiversity. Academic Press Washington.
3. G.G. Simpson : Principles of Animal Taxonomy. Oxford IBH Publication Company.
4. E. Mayer : Elements of Taxonomy.
5. Dobzansky : Biosystematics.
6. Dallela and Sharma : Animal Taxonomy and Museology.
7. Dodzhansky: The Genetics and origin of species. Columbia University Press.
8. Futuyama D.I. Evolutionary Biology. INC Publishers Dunderland.
9. Jha A.P. : Genes and Evolution – John Publication, New Delhi.



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**M.Sc. Zoology**  
**SEMESTER FIRST**  
**Paper - IV**  
**BIOMOLECULES AND STRUCTURAL BIOLOGY**

**MM - 85**

- Unit - I** Chemical Foundation of biology
- PH, PK, acids bases, buffers, weak bonds
  - Free energy, resonance, isomerisation
  - Acid soluble pool of living tissues – aminoacids, monosaccorides, 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

1. Basic concepts of metabolism: Coupled and interconnecting reactions of metabolism cellular energy resources and ATP synthesis
2. Glycolysis and glyconeogenesis
3. Citric acid cycle
4. Oxidative phosphorylation : Protein and it's 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 J.G. Voet. Biochemistry 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.
5. Freifelder, D. Essentials of Molecular Biology
6. Wilson, K. and K.H. Goulding A Biologists Guide to Principals and Techniques of Practical Biochemistry
7. Cooper, T.G. Tools of Biochemistry
8. Hawk, Practical Physiological Chemistry
9. Garret, R.H. and C.M. Grisham. Biochemistry. Saunders college Publishers.



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~~Session 2019-20~~

**Class: M.Sc. Zoology**  
**SEMESTER FIRST**  
**Practical : Ist**

M,M, 50

1. Spotting – Classification and identification of various phylum.
2. One major dissection of various systems of invertebrates –  
Squilla, Prawn, Sepia, Loligo.
3. One minor dissection- Grasshopper, Honeybee, Echinus, Starfish, Aplysia.
4. Mounting material - permanent balsum mount
5. Spottings related with Adaptation. Homologies, Analogics and modification of  
mouth parts :
6. Viva Voce.
7. Pratical Records, collection

**Total Marks**

**50**



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**Class: M.Sc. Zoology**  
**SEMESTER FIRST**  
**Practical : IInd**

**M,M, 35**

1. Problem based on Biodiversity and wild life. 20  
Mammals and Fishers group (Spots 5 +5 )
2. Exercise on mean, mode, & Median. 5
3. Cell division preparation of slid on Meiosis & Mitosis. 5
4. Preparation of different types of chromosomes. 5
5. Viva - Voce 10
6. Practical Record and collection. 5

**Total Marks**

**50**