



ST. ALOYSIUS COLLEGE(AUTONOMOUS), JABALPUR

Reaccredited 'A++' Grade by NAAC(CGPA:3.58/4.00)

College with Potential for Excellence by UGC

DST-FIST Supported & STAR College Scheme by DBT

M.Sc. I Semester

SUBJECT: Zoology

Practical syllabus

Scheme A-1 (For course of science Practical Discipline having Major Practicum Component)

Part A – Introduction			
PROGRAMME: PG Diploma	Class: M.Sc.	1 Year/ 1 Semester	Session – 2025-26
Subject – Zoology			
1	Course Code	PC – 11 (Paper – I)	
2	Course Title	Biosystematics & Animal Diversity	
3	Course Type	Core Course	
4	Pre – requisite (if any)	To study this course a student must have had subject Major Zoology in 3 year Graduation course	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none">• Identify and classify representative animal specimens from all major phyla.• Demonstrate understanding of anatomical structures through slides and models.• Use taxonomic keys and digital tools for biosystematics and species identification.• Conduct field surveys and document local animal biodiversity.• Develop practical skills in microscopy, observation, and scientific recording.• Communicate biological information effectively through reports and presentations	
6	Credit Value	04	
7	Total Marks	Max. Marks: 60 + 40	Min. Passing Marks: 40

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Part B- Content of the Course

Total No. of Lectures- Tutorials- Practical (in hour per week) : 3 hour per week L-T-P

	Topics	No. of Lectures
I	<ul style="list-style-type: none">• Identification & Classification (Museum/Model Specimens):• Protozoa: Amoeba, Paramecium, Trypanosoma• Porifera: Sycon, Spongilla• Cnidaria: Obelia, Aurelia, Hydra• Platyhelminthes: Fasciola, Taenia• Aschelminthes: Ascaris• Annelida: Nereis, Pheretima, Leech• Arthropoda: Palaemon, Periplaneta, Limulus• Mollusca: Pila, Unio, Sepia• Echinodermata: Starfish, Sea Urchin• Chordata: Herdmania, Amphioxus, Scoliodon, Rana, Calotes,• Columba, Oryctolagus	12
II	<ul style="list-style-type: none">• Permanent Slides & Microscopy• Protozoan locomotion (e.g., cilia, pseudopodia)• Spicules (Porifera), Nematocysts (Cnidaria)• T.S, of body wall (Annelida, Ascaris)• Larval forms: trochophore, nauplius, echinoderm larvae• Chordate histological slides (e. g. muscle skin nerve)	12
III	<ul style="list-style-type: none">• Virtual Dissection Models / Simulations• Earthworm: Digestive and reproductive systems• Cockroach: Nervous and reproductive systems• Fish/Amphibian: Circulatory system (use of ICT and simulation tools as per ethical guidelines)	12
IV	<ul style="list-style-type: none">• Biosystematics & Taxonomy Tools• Use of Dichotomous keys• Construction of taxonomic hierarchy• Online taxonomy databases: EOL, ITIS, ZSI, GBIF• Observation and documentation of local fauna (birds, insects, amphibians, etc.)	12

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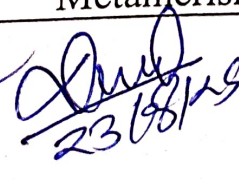
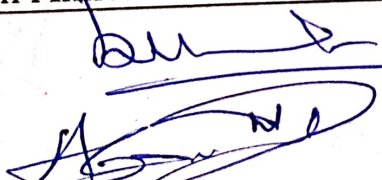
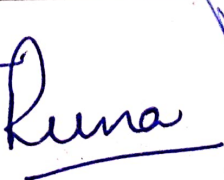
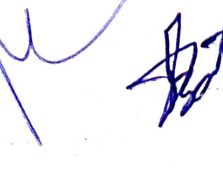
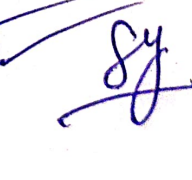
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Part B – Content of the Course

Total No. of Lectures – Tutorials- Practical (in hour per week): 5 hours per week

Unit	Topics	No. of Lectures
I	Principles of Systematics & Species Concept <ul style="list-style-type: none"> Indigenous Zoological Terminologies and Nomenclature: Study of Sanskrit, Pali, and Prakrit terms for animal species, Role of language in taxonomic traditions. Definition, History and basic concepts of biosystematics Alfa, Beta, Gamma Taxonomy Newer trends in Taxonomy (Molecular taxonomic details). Trends in biosystematics: Chemotaxonomy, cytotaxonomy and molecular taxonomy Speciation: Types and Cause Species concepts: Typological, Nominalistic and Biological species concepts. Subspecies and other infra-specific categories. 	18
II	<ul style="list-style-type: none"> Taxonomic Characters and different kinds. Origin of reproductive isolation, biological mechanism of genetic incompatibility. Taxonomic procedures: Taxonomic collections, preservation, curating, 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. 	16
III	Basics of Animals Classification and Non-Chordates (Protozoa to Annelida) <ul style="list-style-type: none"> Basics of taxonomy and classification – Concepts of symmetry, body plans, coelom types, germ layers. Protozoa – General characters, classification, locomotion, Nutrition and Reproduction in protozoa Porifera – Canal system, types of spicules. Coelenterata (Cnidaria) – Polymorphism, coral reefs, Life cycle of <i>Obelia</i>. Platyhelminthes – Parasitic adaptations in <i>Taenia</i> and <i>Fasciola</i>. Aschelminthes (Nematoda) – General features, parasitism in <i>Ascaris</i>. Annelida – Life history of <i>Neries</i> and <i>Pheretima</i> (earthworm), Metamerism in Annelides. 	20



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M.Sc. I Semester

SUBJECT: ZOOLOGY

Theory syllabus

Scheme B-1 (For course of science Discipline having Major Practicum Component)

Part A – Introduction			
PROGRAMME: PG Diploma	Class: M.Sc.	1 Year/ 1 Semester	Session – 2025-26
Subject – Zoology			
1	Course Code	CC – 11 (Paper – I)	
2	Course Title	Biosystematics & Animal Diversity	
3	Course Type	Core Course	
4	Pre – requisite (if any)	To study this course a student must have had subject Major Zoology in 3-year Graduation course	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none">• To Understand Indigenous Zoological Terminologies and Nomenclature.• Identify and classify animals across all major phyla based on structural and functional features.• Understand the evolutionary relationships and ecological roles of various animal groups.• Apply biosystematics principles in taxonomy and species identification.• Develop skills in observation, documentation, and scientific communication.• Students will become Zoologist / Taxonomist	
6	Credit Value	06	
7	Total Marks	Max. Marks: 60 + 40	Min. Passing Marks: 40

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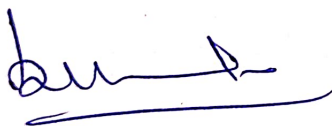
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IV	<p>Non-Chordates and Minor Phyla (Arthropoda to Echinodermata)</p> <ul style="list-style-type: none">• Arthropoda – Segmentation, respiration, and sensory structures in insects and crustaceans, Larval form of Arthropoda.• Mollusca – Shell diversity, radula, torsion in gastropods.• Echinodermata – Water vascular system, larval forms, regeneration.• Minor Phyla – General features and significance of Rotifera, Hemichordata, Ectoprocta, and Chaetognatha.	18
V	<p>Phylum Chordata (From Protochordates to Mammals)</p> <ul style="list-style-type: none">• Protochordates – <i>Balanoglossus</i>, <i>Herdmania</i>, <i>Branchiostoma</i>• Pisces – Types of scales, accessory respiratory organs, Parental care and migration.• Amphibia – Neoteny, parental care.• Reptilia – Adaptive features in reptiles.• Aves – Flight adaptations, types of beaks, feathers and feet, migration.• Mammalia – Dentition, skin derivatives and its functions, aquatic adaptations.	18

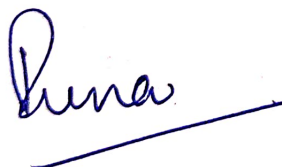

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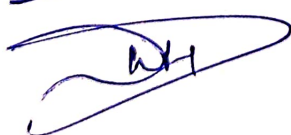







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DST-FIST Supported & STAR College Scheme by DBT

M.Sc. I Semester

SUBJECT: Zoology

Practical syllabus

Scheme B-I(For course of science Practical Discipline having Major Practicum Component)

Part A – Introduction

PROGRAMME: PG
Diploma

Class: M.Sc.

1 Year/ 1 Semester

Session – 2025-26

Subject – Zoology

1 Course Code

PC – 11 (Paper – I)

2 Course Title

Biosystematics & Animal Diversity

3 Course Type

Core Course

4 Pre – requisite (if any)

To study this course a student must have had subject Major Zoology in 3 year Graduation course

5 Course Learning Outcomes (CLO)

- Identify and classify representative animal specimens from all major phyla.
- Demonstrate understanding of anatomical structures through slides and models.
- Use taxonomic keys and digital tools for biosystematics and species identification.
- Conduct field surveys and document local animal biodiversity.
- Develop practical skills in microscopy, observation, and scientific recording.
- Communicate biological information effectively through reports and presentations

6 Credit Value

04

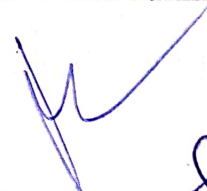
7 Total Marks


Max. Marks: 60 + 40

Min. Passing Marks: 40


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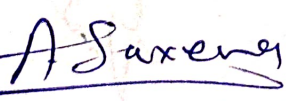
















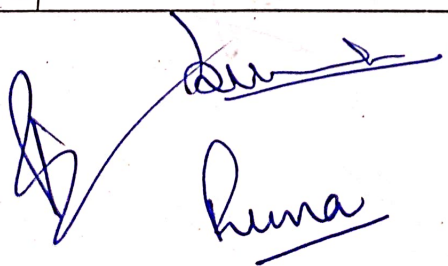
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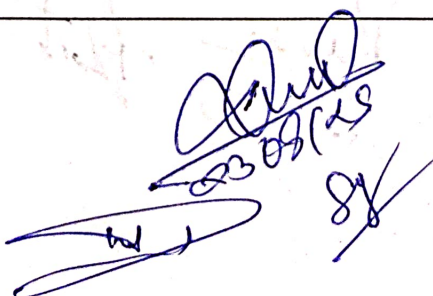
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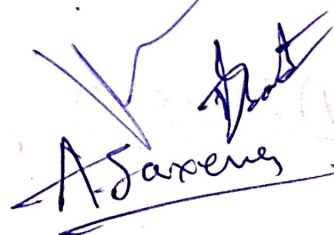
Part B- Content of the Course

Total No. of Lectures- Tutorials- Practical (in hour per week) : 3 hour per week L-T-P

	Topics	No. of Lectures
I	<ul style="list-style-type: none">• Identification & Classification (Museum/Model Specimens):• Protozoa: Amoeba, Paramecium, Trypanosoma• Porifera: Sycon, Spongilla• Cnidaria: Obelia, Aurelia, Hydra• Platyhelminthes: Fasciola, Taenia• Aschelminthes: Ascaris• Annelida: Nereis, Pheretima, Leech• Arthropoda: Palaemon, Periplaneta, Limulus• Mollusca: Pila, Unio, Sepia• Echinodermata: Starfish, Sea Urchin• Chordata: Herdmania, Amphioxus, Scoliodon, Rana, Calotes,• Columba, Oryctolagus	12
II	<ul style="list-style-type: none">• Permanent Slides & Microscopy• Protozoan locomotion (e.g., cilia, pseudopodia)• Spicules (Porifera), Nematocysts (Cnidaria)• T.S. of body wall (Annelida, Ascaris)• Larval forms: trochophore, nauplius, echinoderm larvae• Chordate histological slides (e. g. muscle skin nerve)	12
III	<ul style="list-style-type: none">• Virtual Dissection Models / Simulations• Earthworm: Digestive and reproductive systems• Cockroach: Nervous and reproductive systems• Fish/Amphibian: Circulatory system (use of ICT and simulation tools as per ethical guidelines)	12
IV	<ul style="list-style-type: none">• Biosystematics & Taxonomy Tools• Use of Dichotomous keys• Construction of taxonomic hierarchy• Online taxonomy databases: EOL, ITIS, ZSI, GBIF• Observation and documentation of local fauna (birds, insects, amphibians, etc.)	12


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V	<p>Field Study & Project Work</p> <ul style="list-style-type: none">• Local biodiversity survey (college campus/pond/forest/park)• Preparation of Field Note Book: common name, scientific name, features• Submission of field report with photographs/drawings• Optional mini project ' Animal diversity in My Locality	12
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M.Sc. I Semester

Subject: Zoology

Theory syllabus

Scheme B-1(For course of science Practical Discipline having Major Practicum Component)

Part A – Introduction			
PROGRAMME: PG Diploma	Class: M.Sc.	1 Year/ 1 Semester	Session – 2025-26
Subject – Zoology			
1	Course Code	CC – 12 (Paper- II)	
2	Course Title	Molecular Cell Biology & Genetics	
3	Course Type	Core Course	
4	Pre – requisite (if any)	To study this course a student must have had subject Major Zoology in 3-year Graduation course	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none">To know about Ancient Indian Concepts of the Cell.Understand Genetic Disorders and their Interpretation in Ancient Texts.Understand cell structure, function, and Communication.Explain molecular mechanisms of DNA Replication, transcription, translation.Analyze gene regulation in prokaryotes and Eukaryotes.Discuss genetic disorders and applications of Biotechnology.Integrate cell and genetic knowledge to Understand diseases like cancer.Students will become biomedical research, Genomics, biotechnology, diagnostics, Teaching and Ayurgenomics, in both academic and industrial sectors	
6	Credit Value	06	
7	Total Marks	Max. Marks: 60+40	Min. Passing Marks: 40



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Part B- Content of the Course

Total No. of Lectures- Tutorials- Practical (in hour per week) : 5 hour per week L-T-P

Unit	Topics	No. of Lectures
I	<p>Ancient Indian Concepts of the Cell.</p> <ul style="list-style-type: none">• Philosophical parallels to cellular structure, function. <p>Membrane structure and function.</p> <ul style="list-style-type: none">• Plasma Membrane: Membrane transport mechanism; transport of macromolecules, Electrical Properties of membranes.• Protein Sorting and Intracellular transport.• Electrical properties of Membrane. <p>Structural organization of intracellular organelles.</p> <ul style="list-style-type: none">• Structure and Function of nucleus, Cytoskeleton, Endoplasmic reticulum, Mitochondria, Golgi Apparatus, Lysosomes.	16
II	<p>Cell signaling and Communication</p> <ul style="list-style-type: none">• Hormones and their receptors, Extracellular signal And cellular response.• Cell surface receptors , highly conserved components of intracellular signal transduction pathways.• G protein coupled receptor systems: Regulation of ion Channels; Activation or inhibition of adenyl cyclase, activation of phospholipase.• Cell signaling pathways that control gene activity: TGFβ receptors and Smad transcription factors; Cytokine receptors ; Tyrosine kinase receptor.• Cell Junctions: Types and functions; Cadherins mediated adhesion, Catenine actin mediated contraction, role of Desmosomes for mechanical strength, tight junctions and transmembrane adhesion, scaffold proteins, Gap junctions: Metabolic and Electrical activity ; Plasmodesmata.• Cancer: Oncogenes, Tumor Suppressor Genes, Cancer and cell cycle, virus induced cancer, metastasis, therapeutic intervention of uncontrolled cell growth.	20

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III	<p>The cellular and molecular basis of inheritance.</p> <ul style="list-style-type: none">• Nucleus, Human Chromosome structure, DNA and its type.• Cell divisions: chromosomes segregation during mitosis and meiosis.• Inheritance: Mendelian Law (law of segregation, law of independent assortment, law of segregation and independent assortment), Non mendelian Inheritance• Gene interaction, multiple allele, Sex linked Inheritance.• Linkage, Crossing Over.	18
IV	<ul style="list-style-type: none">• Genome Replication and Replication Associated Errors: DNA replication (Bacterial and Eukaryotic chromosomal replication), Replication associated errors.• DNA Damage and Repair : DNA damages• (Oxidative damages, Depurinations, Depyrimidinations, Cytosine deamination, single and double strand breaks), Repair mechanisms (Photo reactivation, excision repair, mismatch repair, post replication repair, SOS repair).• Genetic code	18
V	<p>Pedigree analysis: Family history, pedigree symbols, construction of pedigrees, Complications to the basic pedigree patterns.</p> <p>Human genetic disorders</p> <ul style="list-style-type: none">• Overview of mendelian inheritance and diseases.• Sickle cell, hemochromatosis, cystic fibrosis, Duchenne muscular dystrophy.• Huntington's disease, achondroplasia, phenylketonuria.• Turner Syndrome, Down syndrome, Patau syndrome, Klinefelter syndrome.• Structural aberration of chromosomes.• Genetic disorders and their Interpretation in Ancient Texts: Descriptions of congenital conditions (<i>Janma dosha</i>) in Ayurvedic and astrological texts.	18

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M.Sc. I Semester

SUBJECT: Zoology

Practical syllabus

Scheme B-1 (For course of science Practical Discipline having Major Practicum Component)

Part A – Introduction			
PROGRAMME: PG Diploma	Class: M.Sc.	1 Year/ 1 Semester	Session – 2025-26
Subject – Zoology			
1	Course Code	PC – 12 (Paper- II)	
2	Course Title	Molecular Cell Biology & Genetics	
3	Course Type	Molecular Cell Biology & Genetics	
4	Pre – requisite (if any)	To study this course a student must have had subject Major Zoology in 3 year Graduation course	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none">• Understand basic molecular biology techniques (e.g.-DNA extraction,PCR,Gel electrophoresis)• Use microscopy to study cell structure and identify cellular components.• Analyze and interpret experimental data in molecular and genetics studies.• Apply techniques to study inheritance patterns and genetic traits.• To know local and regional genetic disorder.	
6	Credit Value	04	
7	Total Marks	Max. Marks: 60+40	Min. Passing Marks: 40

Dr. A. Saxena

23/08/23

Dr. R. K. Singh



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Part B- Content of the Course

Total No. of Lectures- Tutorials- Practical (in hour per week) : 3 hour per week L-T-P

Unit	Topics	No. of Lectures
I	<ul style="list-style-type: none">• Observation of Mitosis and Meiosis in plant or animal tissues (e.g. onion root tips, grasshopper testis).• Preparation and staining of human metaphase chromosomes (karyotyping).• • Identification of chromosomes structures and types of DNA sequences using prepared slides or chromosome models.	15
II	<ul style="list-style-type: none">• DNA isolation from plant (e.g.-spinach) or animal cells.• Using bacterial cultures (e.g.-UV irradiation effect).• • Demonstration of DNA repair mechanisms through literature based simulations or experimental design discussions.	15
III	<ul style="list-style-type: none">• Pedigree chart construction from given family data• Case studies on genetic disorders (Sickle cell anemia, cystic fibrosis, etc.)• Simulation or Analysis of mendelian and Non-mendelian ratios using seeds, beads or software.	15
IV	<ul style="list-style-type: none">• Model-based demonstration of cell signaling pathways (e.g.-GPCR and tyrosine kinase pathways).• Study of hormonal effects on plant growth (e.g.-auxin and phototropism)• Cancer cell morphology through microscope observation of cell cultures or images.	15

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