

TYBSC ZOOLOGY NEP POs & COs

Aims and Objectives :

- ❖ Focuses on developing a strong conceptual foundation in classical and applied zoology, enabling learners to understand animal diversity, structure, function, evolution, and ecological relationships.
- ❖ Aims to provide comprehensive knowledge of biochemical, physiological, molecular, genetic, histological, and environmental aspects of animal biology along with their practical applications.
- ❖ Emphasizes analytical thinking, experimental skills, field-based learning, and scientific data interpretation through laboratory investigations and research-oriented training.
- ❖ Introduces learners to modern interdisciplinary tools and emerging technologies such as bioinformatics, artificial intelligence, clinical research, and computational approaches in biological sciences.
- ❖ Promotes understanding of applied areas of zoology including medical and forensic zoology, entomology, fisheries, poultry management, agrochemical applications, environmental assessment, and reproductive technologies.
- ❖ Helps develop professional competencies, communication skills, ethical awareness, entrepreneurial mindset, and employability required in higher education, research, healthcare, industry, and allied life science sectors.
- ❖ Encourages scientific temperament, environmental responsibility, community engagement, and skill-based learning through vocational training, field projects, and on-job training.

Program Outcomes (POs) :

The curriculum is designed after extensive consultation with stakeholders to provide students with fundamental, applied, and research-oriented knowledge in zoological sciences. After successful completion of B.Sc. Zoology Major / Honours Program, students will be able to achieve the following outcomes:

PO 1	Disciplinary Knowledge Develops in-depth knowledge of core and applied areas of zoology including biodiversity, taxonomy, anatomy, physiology, biochemistry, molecular biology, genetics, ecology, evolutionary biology, entomology, animal behaviour, wildlife biology, bioinformatics, and emerging interdisciplinary fields.
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PO 2	Practical and Technical Skills Enhances laboratory, field-based, and experimental skills required for specimen identification, data collection, scientific observation, biological analysis, and interpretation using modern tools and techniques.
PO 3	Critical Thinking and Problem Solving Builds the ability to critically analyse biological problems, interpret scientific evidence, and develop logical solutions using analytical and scientific approaches.
PO 4	Research Competency Develops competence in research methodology, scientific documentation, data analysis, report writing, and interpretation of experimental results in zoological sciences.
PO 5	Digital and Computational Proficiency Promotes efficient use of digital tools, bio-statistical software, computational methods, artificial intelligence, and bioinformatics resources for biological data analysis and research.
PO 6	Communication and Scientific Expression Strengthens communication skills required for effective presentation, scientific writing, academic discussion, and dissemination of zoological knowledge.
PO 7	Ethical and Environmental Responsibility Promotes ethical scientific practices by discouraging plagiarism, data manipulation, and unethical research practices while fostering awareness of environmental sustainability, biodiversity conservation, and biosafety.
PO 8	Teamwork and Leadership Encourages collaborative learning, leadership qualities, project management skills, and responsible participation in academic, professional, and community-based activities.
PO 9	Entrepreneurship and Employability Develops professional competencies, vocational skills, and entrepreneurial abilities in applied zoology sectors such as fisheries, poultry, clinical diagnostics, environmental consultancy, wildlife management, and allied life science industries.
PO 10	Lifelong Learning and Advanced Education Encourages self-directed learning, adaptability, innovation, and pursuit of higher education, research, and career advancement in emerging areas of biological sciences.

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Program Specific Outcomes (PSOs)

After successful completion of the program, students will be able to:

PSO 1	Apply knowledge of animal diversity, taxonomy, morphology, physiology, and ecology to understand the structural and functional organization of animals.
PSO 2	Analyze ecological interactions and evolutionary relationships among animals and their environment for biodiversity conservation and ecosystem management.
PSO 3	Demonstrate practical competency in laboratory and field techniques related to taxonomy, physiology, ecology, genetics, molecular biology, biochemistry, entomology, and applied zoology.
PSO 4	Apply interdisciplinary knowledge in emerging fields such as bioinformatics, artificial intelligence, clinical research, environmental assessment, and molecular biology for scientific investigation.
PSO 5	Utilize modern biological tools, computational methods, and research techniques for data collection, analysis, interpretation, and scientific reporting.
PSO 6	Develop professional and vocational skills relevant to applied zoological sectors including fisheries, poultry management, medical and veterinary entomology, agrochemical applications, forensic sciences, and wildlife conservation.
PSO 7	Evaluate the economic, environmental, and societal importance of animals and animal- derived resources in sustainable development and human welfare.
PSO 8	Demonstrate ethical awareness, scientific temperament, problem-solving ability, and responsible decision-making in academic, research, and professional settings.
PSO 9	Pursue higher education, research, entrepreneurship, and employment opportunities in diverse life science and allied sectors.
PSO 10	Contribute meaningfully to society through scientific awareness, environmental responsibility, community engagement, and nation building.

COURSE OUTCOMES
ZOO – 301- MJ : BIOCHEMISTRY

CO 1	Understand the fundamental building blocks of living organisms that include carbohydrates, proteins, lipids, nucleic acids
CO 2	Understand the physiological importance of these biomolecules.
CO 3	Understand the enzyme activity, kinetics and various metabolic pathways.
CO 4	Understand basic concepts and significance of biochemistry.
CO 5	Interpret the structure-functional relationships of carbohydrates, proteins, lipids and Nucleic acids.
CO 6	Understand the properties of various biomolecules.
CO 7	Appreciate the action of the enzyme and the various factors that affect their action detail and comprehend variations in enzyme activity and kinetics.

ZOO - 302 - MJ : VERTEBRATE ZOOLOGY – 1

CO 1	Understand the origin, evolution and diversity of chordates.
CO 2	Differentiate chordates from non-chordates using comparative morphology.
CO 3	Explain classification and phylogenetic relationships among vertebrates.
CO 4	Identify economically and ecologically important vertebrates.
CO 5	To identify vertebrate groups based on structural and adaptive features.
CO 6	Explain the general characteristics and evolutionary advancement of Vertebrata.
CO 7	Describe different types of scales, fins and parental care adaptations in vertebrates.
CO 8	Develop practical and analytical skills related to vertebrate anatomy and biodiversity
CO 9	Analyze the anatomy, physiology and adaptive features of <i>Scoliodon</i> .
CO 10	Apply modern zoological techniques such as molecular taxonomy, biodiversity assessment and digital identification tools in vertebrate studies.

ZOO – 303 –MJ : ANIMAL PHYSIOLOGY

CO 1	Understand the structure, function, and biochemistry of major animal organ systems.
CO 2	Analyze how negative and positive feedback loops maintain a stable internal environment.
CO 3	Compare physiological systems across different animal groups to see how evolution shaped them.
CO 4	Safely perform standard blood and biochemical tests (e.g., blood typing, hemoglobin estimation).
CO 5	Use virtual labs and simulation software to analyze complex processes like cardiac cycles.
CO 6	Collect, graph, and interpret physiological data (e.g., spirometry, enzyme kinetics).
CO 7	Link normal body functions to clinical disorders like diabetes, hypertension, and anemia.
CO 8	Evaluate how animals adapt to extreme environments (e.g., high altitudes, osmotic stress).
CO 9	Design and run basic physiology projects while strictly following animal welfare guidelines.
CO 10	Present and write about complex physiological concepts and lab results clearly.

ZOO – 304 – MJ : AGROCHEMICALS AND PEST MANAGEMENT

CO 1	Explain the role and classification of agrochemicals in crop protection.
CO 2	Identify common agricultural pests and understand their biology and damage patterns.
CO 3	Describe different chemical and biological methods used for pest control.
CO 4	Explain the toxic effects of agrochemicals on humans, animals and environment.
CO 5	Apply the principles of Integrated Pest Management in sustainable agriculture.
CO 6	Develop awareness about safe and responsible use of agrochemicals.

**ZOO – 305 – PRACTICALS IN BIOCHEMISTRY AND
VERTEBRATE ZOOLOGY – I**

BIOCHEMISTRY PRACTICALS	
CO 1	Learn about different biomolecules
CO 2	Understand and prepare different standard graphs for protein and carbohydrate
CO 3	Learn the isolation of different biomolecules from natural sources.
CO 4	Understand how to prepare a different molarity solution.
CO 5	Understand different spot tests for biomolecules.
CO 6	Understand how to calculate the unknown concentration of carbohydrates.
CO 7	Understand the calculation of enzyme activity and specific activity.

**ZOO – 306 – PRACTICALS IN ANIMAL PHYSIOLOGY
AND AGROCHEMICALS AND PEST MANAGERMENTS**

CO 1	To identify common agricultural pests and describe their biology, host plants and damage symptoms.
CO 2	To classify major agrochemicals and explain their role in crop protection and pest management.
CO 3	To demonstrate basic skills in pest surveillance, pest monitoring and calculation of pest infestation.
CO 4	To explain safe handling, storage, dilution and disposal of pesticides with proper use of personal protective equipment.
CO 5	To apply the principles of biological control, biopesticides and Integrated Pest Management for sustainable agriculture.

ZOO – 310 – MJ – MEDICAL AND FORENSIC ZOOLOGY

CO 1	Explain the basic concepts, scope, objectives, and interdisciplinary nature of forensic science and its role in the criminal justice system.
CO 2	Describe the concept of crime, crime scene investigation, and the significance of forensic science in criminal cases.
CO 3	Interpret the basic legal framework relevant to forensic science, including the Constitution of India, criminal justice system, BNS, BNSS, and BSA, 2023.
CO 4	Differentiate various types of evidence and explain the admissibility and importance of expert opinion in judicial proceedings.
CO 5	Identify and examine biological evidence, DNA profiling techniques, and their applications in forensic investigations.
CO 6	Explain the principles of forensic toxicology, poisoning, narcotic drugs, alcohol intoxication, and medico-legal aspects related to

	toxicological investigations.
CO 7	Analyze crime scene evidence including fingerprints, ballistics, forensic entomology, digital evidence, and modern forensic investigation tools.
CO 8	Describe the structure, functions, and significance of forensic science laboratories and evaluate career opportunities available in the field of forensic science.

ZOO – 313 – MJP – PRACTICALS IN MEDICAL AND FORENSIC ZOOLOGY

CO 1	Explain the role and classification of agrochemicals in crop protection.
CO 2	Identify common agricultural pests and understand their biology and damage patterns.
CO 3	Describe different chemical and biological methods used for pest control.
CO 4	Explain the toxic effects of agrochemicals on humans, animals and environment.
CO 5	Apply the principles of Integrated Pest Management in sustainable agriculture.
CO 6	Develop awareness about safe and responsible use of agrochemicals.

ZOO – 321 – MJP – PRACTICALS IN FUNDAMENTALS POULTRY MANAGEMENT

CO 1	Identify and describe important Indian and exotic poultry breeds based on their morphological, productive, and economic characteristics.
CO 2	Explain and compare different poultry housing systems and demonstrate the proper use of poultry equipment used in feeding, watering, brooding, incubation, and management.
CO 3	Prepare poultry ration using various feed ingredients and calculate feed requirement, production cost, and Feed Conversion Ratio (FCR) for poultry farming.
CO 4	Examine the internal structure of egg and evaluate egg quality using standard indices such as shape index, albumen index, yolk index, and Haugh unit.
CO 5	Demonstrate incubation, hatchery management, egg candling, brooding practices, temperature regulation, and light management for chicks.
CO 6	Apply poultry vaccination schedules and identify common viral, bacterial, fungal, and parasitic diseases along with their preventive and control measures.
CO 7	Perform basic poultry management practices including dressing of chicken, beak trimming, deworming, delousing, and

	vaccination techniques.
CO 8	Analyze poultry products and develop practical understanding of commercial poultry farm operations through field visits and report preparation.

ZOO – 331 – MJP – COMMUNITY ENGAGEMENT PROGRAM

CO 1	Develop environmental awareness and ecological sensitivity through participation in community-oriented and field-based activities.
CO 2	Demonstrate social responsibility and active community participation while engaging in environmental and biodiversity-related activities.
CO 3	Develop effective communication and interpersonal skills through community interaction, outreach activities, and collaborative participation.
CO 4	Demonstrate teamwork and collaborative learning abilities during field-based and community engagement activities.
CO 5	Identify local environmental and community-related issues and apply basic problem-solving approaches in real-world situations.
CO 6	Develop leadership and organizational abilities through planning, coordination, and execution of community engagement activities.
CO 7	Demonstrate ethical values, responsible conduct, and respect for local communities, biodiversity and environmental sustainability during field engagement.
CO 8	Develop appreciation for local ecological knowledge, biodiversity conservation, sustainability, and community perspectives through experiential learning.
CO 9	Gain practical exposure and field-based learning experience through biodiversity documentation, ecological observations, and community-oriented activities.
CO 10	Develop documentation, reporting, and presentation skills through maintenance of field records, preparation of reports, and communication of findings.
CO 11	Develop critical thinking and reflective learning abilities through analysis of field experiences, environmental observations, and community interactions.

ZOO – 341 – MN – AMAZING WORLD OF VERTEBRATES

CO 1	Explain the origin, evolution, and general characteristics of vertebrates.
CO 2	Classify vertebrates up to class level using distinguishing morphological features and examples.
CO 3	Differentiate between jawless and jawed vertebrates and interpret their evolutionary significance.
CO 4	Describe structural and functional adaptations in aquatic, aerial,

	arboreal, fossorial, and desert vertebrates.
CO 5	Analyze locomotory adaptations in fishes, birds, and mammals with suitable examples.
CO 6	Explain migration, camouflage, mimicry, and defense mechanisms in vertebrates.
CO 7	Interpret behavioral patterns such as feeding, parental care, communication, and social organization in vertebrates.
CO 8	Discuss ecological and economic importance of vertebrates and evaluate the need for wildlife conservation.
CO 9	Identify endangered and endemic vertebrates of India and explain conservation strategies and protected areas.
CO 10	Develop observational and analytical skills through field studies, biodiversity surveys, and identification of vertebrate fauna.

SECOND SEMESTER

ZOO – 351 – MJ - MOLECULAR BIOLOGY

CO 1	Describe the basic structure and chemistry of DNA and RNA
CO 2	Compare and contrast DNA replication machinery and mechanisms in prokaryotes and eukaryotes.
CO 3	Elucidate the molecular machinery and mechanism of information transfer processes– transcription and translation-in prokaryotes and eukaryotes.
CO 4	Explain post-transcriptional modification mechanisms for the processing of eukaryotic RNAs
CO 5	Discuss general principles of transcription regulation in prokaryotes by exploring the structure and function of lactose operon
CO 6	Explain the significance of DNA repair mechanisms in controlling DNA damage
CO 7	Use or demonstrate the basic techniques of biotechnology like DNA isolation, PCR, transformation, restriction digestion etc

ZOO – 352 – MJ – VERTEBRATE ZOOLOGY - II

CO 1	Describe general characteristics and classification of reptiles, birds and mammals
CO 2	Explain the salient features and classification of Reptilia, Aves and Mammalia
CO 3	Analyze adaptive radiation and special adaptations in vertebrates.
CO 4	Explain snake poison apparatus, biting mechanism and basic toxicology of snake venom.
CO 5	Understand migration, parental care, flight adaptations and locomotory adaptations in Vertebrates.
CO 6	Describe anatomy and physiological systems of Rat.
CO 7	Develop practical and analytical skills related to vertebrate anatomy and biodiversity.

CO 8	Understand anatomical organization of Rat as a representative mammal.
CO 9	Apply modern zoological techniques such as molecular taxonomy, biodiversity assessment and digital identification tools in vertebrate studies.

ZOO – 353 – MJ – MAMMALIAN HISTOLOGY

CO 1	Explain the scope, significance, and fundamental concepts of histology and histopathology, including the classification and characteristics of basic animal tissues.
CO 2	Identify and describe the microscopic structure and functions of mammalian epithelial, connective, muscular, and nervous tissues.
CO 3	Analyze the histological organization of mammalian organs such as skin, tooth, and tongue, and correlate their structures with physiological functions.
CO 4	Interpret the histological features of the alimentary canal and associated digestive glands, including the oesophagus, stomach, duodenum, rectum, and liver.
CO 5	Examine the microscopic anatomy of respiratory and excretory organs, including the trachea, lung, kidney, and juxtaglomerular complex, and explain their functional significance.
CO 6	Describe the histological organization of reproductive organs and endocrine glands and relate their structures to reproductive and hormonal functions.
CO 7	Demonstrate knowledge of histochemical techniques, staining methods, and microtomy used in the preparation and analysis of histological specimens.
CO 8	Evaluate the applications of histology and histochemistry in disease diagnosis, biomedical research, and oncological studies.

ZOO – 354 – MJ – ENTOMOLOGY

CO 1	Explain the scope, branches, classification, diversity, and ecological significance of insects, and their role in human welfare.
CO 2	Describe the external morphology of insects, including integument, head, and thorax, abdomen, antennae, mouthparts, wings, and leg modifications.
CO 3	Analyze the structure and functions of major organ systems in insects, including digestive, circulatory, respiratory, nervous, sensory, and reproductive systems.
CO 4	Explain insect development, metamorphosis, and the hormonal mechanisms regulating growth and developmental changes.
CO 5	Evaluate the influence of abiotic and biotic factors on insect ecology and interpret behavioral adaptations such as mimicry, camouflage, and communication
CO 6	Describe the social organization and division of labor in eusocial

	insects such as termites, ants, and honey bees, and assess their ecological importance.
CO 7	Differentiate between beneficial and harmful insects and evaluate their economic significance in agriculture, industry, public health, and ecosystems.
CO 8	Apply the principles of modern entomology, including Integrated Pest Management (IPM), biological control, molecular entomology, forensic entomology, climate change impacts, and emerging technologies in pest management

ZOO – 355 – MJP – PRACTICALS IN MOLECULAR BIOLOGY AND VERTEBRATE ZOOLOGY – II

CO 1	Identify and classify important vertebrates belonging to Reptilia, Aves, and Mammalia based on diagnostic characters
CO 2	Distinguish between poisonous and non-poisonous snakes using pictorial taxonomic keys and external features.
CO 3	Examine vertebrate tissues such as reptilian scales, feathers of birds and mammalian hair under laboratory conditions.
CO 4	Demonstrate knowledge of digestive, circulatory, nervous, and reproductive systems of Rat.
CO 5	Analyze adaptive modifications in beaks and feet of bird in relation to feeding habits and habitat.
CO 6	Apply laboratory safety measures, sterilization techniques, and good laboratory practices in molecular biology experiments.
CO 7	Understand the structure and characteristics of DNA and RNA through models and Staining techniques.
CO 8	Perform quantitative estimation of nucleic acids using biochemical methods such as Diphenylamine and Bial's Orcinol methods.
CO 9	Isolate DNA from biological materials and interpret its absorption spectra using spectrophotometric techniques.
CO 10	Explain the principles and applications of modern molecular techniques such as PCR, SDS-PAGE, agarose gel electrophoresis and western blotting.

ZOO – 356 – MJP – PRACTICALS IN MAMMALIAN HISTOLOGY AND ENTOMOLOGY

CO 1	Identify and differentiate various mammalian tissues, including epithelial, connective, muscular, and nervous tissues, using permanent slides
CO 2	Examine and interpret the histological organization of mammalian organs such as skin, tooth, tongue, digestive organs, endocrine glands, and reproductive organs.
CO 3	Analyze the cellular components of human blood and perform temporary mounting techniques for mammalian muscle tissues

CO 4	Describe the external morphology of insects and distinguish major structural modifications of insect head, mouthparts, antennae, legs, and wings.
CO 5	Perform dissections of locally available insects and identify the structural organization of digestive and reproductive systems.
CO 6	Classify insect developmental stages, including different types of eggs, larvae, and pupae, and explain their biological significance.
CO 7	Evaluate insect diversity, social organization, and the role of medically and economically important insect vectors and pests
CO 8	Develop practical skills in specimen collection, preservation, identification, temporary mounting, field survey methods, and scientific report preparation related to insect diversity and pest management.

ZOO – 360 – MJ – DEVELOPMENTAL BIOLOGY

CO 1	Explain the fundamental concepts and scope of developmental biology, including potency, commitment, induction, determination, differentiation, stem cells, and genomic equivalence.
CO 2	Describe the processes of human gametogenesis, including spermatogenesis, oogenesis, and the structural organization of sperm, ovum, and different types of eggs.
CO 3	Analyze the mechanisms and significance of fertilization, including sperm–egg interactions, acrosome reaction, capacitation, prevention of polyspermy, and activation of the ovum.
CO 4	Classify and interpret the patterns of cleavage and blastulation, including planes, symmetry, types, and developmental significance.
CO 5	Explain the process of gastrulation and evaluate the role of morphogenetic movements and embryonic organizers in early vertebrate development.
CO 6	Describe the major stages of chick embryogenesis, including fertilization, cleavage, primitive streak formation, head process development, and regression of the primitive streak.
CO 7	Assess the mechanisms of post-embryonic development, regeneration, metamorphosis, environmental regulation of development, and sex determination in vertebrates.
CO 8	Evaluate the biological significance of programmed cell death, aging, and cellular senescence in growth, development, and maintenance of organisms.

ZOO – 363 – MJP – PRACTICALS IN DEVELOPMENTAL BIOLOGY

CO 1	Explain the processes of spermatogenesis and oogenesis and identify the structural features of human gametes.
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CO 2	Classify and compare different types of eggs based on yolk content and yolk distribution in various animal groups.
CO 3	Differentiate between various types of fertilization and evaluate their biological significance.
CO 4	Describe the structure of a hen's egg and explain the early stages of chick embryonic development, including fertilization, cleavage, blastulation, and gastrulation.
CO 5	Prepare, observe, and interpret temporary mounts of chick embryos to understand embryonic developmental stages.
CO 6	Analyze the morphology and organogenesis of chick embryos through the study of transverse and vertical sections at different developmental stages.
CO 7	Demonstrate knowledge of assisted reproductive technologies (ARTs), including IUI, IVF, GIFT, ZIFT, superovulation, and cryopreservation techniques.
CO 8	Develop practical skills in the observation, identification, interpretation, and documentation of embryological and reproductive biological specimens, slides, models, and charts.

ZOO – 372 – MJP – PRACTICALS IN FISHERY MANAGEMENT AND MARKETING

CO 1	Identify important fish species used in fish culture.
CO 2	Recognize and describe common fishing crafts and gears used in capture fisheries.
CO 3	Estimate quality of pond water.
CO 4	Identify fish diseases, nature of damage and control.
CO 5	Identify fish parasites, nature of damage and control.
CO 6	Demonstrate preparation of fish value added products.
CO 7	Demonstrate various fish preservation techniques.
CO 8	Conduct regional fish market surveys and design questionnaires.
CO 9	Assess fish stock and fish health.
CO 10	Experience fish rearing practice through visit.

ZOO – 381 – OJT – ON JOB TRAINING

CO 1	Develop useful, career-related skills that improve their ability to successfully finish tasks allocated to them.
CO 2	Learn how to operate sophisticated equipment (such as FTIR, centrifuges, spectrophotometer, microscopes, etc.) and carry out population monitoring and field sampling procedures.
CO 3	Perform job-related procedures such as tissue processing, hematological investigations, clinical or diagnostic tests utilized in veterinary and medical laboratories, or other techniques.
CO 4	Understand small-scale business endeavor, learn about economic

	harvesting, resource management, and commercial possibilities of animal byproducts.
CO 5	Learn about biosecurity, workplace safety laws, and the professional ethics needed in agricultural and biological research institutions.
CO 6	Analyze daily logs and keep reports, learn how to work with specialists in the field, and successfully communicate project results.