

GOVT. POSTGRADUATE COLLEGE, GUNA

Affiliated to Jiwaji University, Gwalior (M.P.)

Phone No.: 07542-251641

Email : hegpgcgun@mp.gov.in

Website : <https://highereducation.mp.gov.in/?orgid=179>



Bachelor of Science Subject: Zoology

Program Specific Outcomes

After completion of B.Sc. Zoology students will be able to-

1. Do M.Sc. in any discipline of life sciences
2. Do jobs in any Government or private sector where zoology subject is required
3. Appear in different administrative exams conducted by different state PSCs and UPSC
4. Work as lab assistant in schools and colleges
5. Appear in Education Degree program
6. Plan and execute experiments or investigations, analyse and interpret data information, collected using appropriate methods
7. Develop scientific temper and thus can prove to be more beneficial for the society
8. Think critically, follow innovations and developments in science and technology



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I Year / Certificate Course

| COURSE TITLE | COURSE LEARNING OUTCOMES |
|--|--|
| <p>ANIMAL DIVERSITY: NON-CHORDATA</p> <p>S1-ZOOL-1T <i>Major-I</i></p> | <p><i>After the completion of the course, students will be able to-</i></p> <ol style="list-style-type: none"> 1. Learn about the importance of systematics, taxonomy and phylogeny to get a concrete idea of evolution of Non-chordate phyla 2. Understand the various morphological, anatomical structures and functions of animals of different phyla 3. Get the knowledge about economic, ecological and medical significance of various animals in human welfare 4. Understand the important parasites and their control measures |
| <p>CELL BIOLOGY, REPRODUCTIVE BIOLOGY AND DEVELOPMENTAL BIOLOGY</p> <p>S1-ZOOL-2T <i>Major-II / Minor / Open Elective</i></p> | <p><i>After the completion of the course, students will be able to-</i></p> <ol style="list-style-type: none"> 1. Develop deeper understanding of what life is? And how it functions at cellular level. 2. Understand the nature and basic concepts of cell biology, reproductive biology and developmental biology 3. Understand structure and functions of cell membranes and cell organelles 4. Understand importance of latest reproductive trends and techniques used for human welfare 5. Understand the general pattern of various developmental patterns and embryogenesis in chordates |
| <p>INVERTEBRATA (PRACTICAL)</p> <p>S1-ZOOL-1P <i>Major-I (Practical)</i></p> | <p><i>At the end of the lab work, a student will be able to-</i></p> <ol style="list-style-type: none"> 1. Identify invertebrate animals of different phyla and their histology through study of museum specimens and slides 2. Learn their different systems of invertebrates through dissections 3. Enhance collaborative learning and communication skills through practical sessions |
| <p>CYTOLOGY, REPRODUCTIVE BIOLOGY AND EMBRYOLOGY (PRACTICAL)</p> <p>S1-ZOOL-2P <i>Major-II / Minor / Open Elective (Practical)</i></p> | <p><i>At the end of the lab work, a student will be able to-</i></p> <ol style="list-style-type: none"> 1. Understand different stages of embryology 2. Prepare squash to understand the stages of cell division and structure of special types of chromosomes 3. Enhance collaborative learning and communication skills through practical sessions |

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II Year / Diploma Course

| COURSE TITLE | COURSE LEARNING OUTCOMES |
|---|--|
| <p>DIVERSITY OF CHORDATES AND COMPARATIVE ANATOMY</p> <p>S2-ZOOL-1T <i>Major-I</i></p> | <p><i>After the completion of the course, students will be able to-</i></p> <ol style="list-style-type: none"> 1. Understand chordate diversity of animals and their taxonomic positions 2. Comprehend and explain the evolutionary relationship among the various chordate groups 3. Understand the ecological distribution and evolutionary divergence of chordates 4. Understand two major concepts of comparative anatomy, Homologous structures - Analogous structures 5. Learn fundamental steps of organogenesis |
| <p>PHYSIOLOGY AND BIOCHEMISTRY</p> <p>S2-ZOOL-2T <i>Major-II / Minor / Open Elective</i></p> | <p><i>After the completion of the course, students will be able to-</i></p> <ol style="list-style-type: none"> 1. Understand how organ functions at different levels from cellular to system 2. Examine the internal harmony of the different body system by learning inherent disorders, and deficiencies, which is needed to maintain good health 3. Understand the function of biomolecules and their role in metabolism |
| <p>CHORDATE ZOOLOGY (PRACTICAL)</p> <p>S2-ZOOL-1P <i>Major-I (Practical)</i></p> | <p><i>At the end of the lab work, a student will be able to-</i></p> <ol style="list-style-type: none"> 1. Learn characteristics of different classes of vertebrates through Preserved specimens 2. Learn technique of dissection and mounting for study anatomy 3. Get knowledge how vertebrates organs differ from class to class by comparative study of osteology and histology |
| <p>SYSTEM PHYSIOLOGY AND BIOCHEMISTRY (PRACTICAL)</p> <p>S2-ZOOL-2P <i>Major-II / Minor / Open Elective (Practical)</i></p> | <p><i>At the end of the lab work, a student will be able to-</i></p> <ol style="list-style-type: none"> 1. The effect of temperature and pH on enzyme activity 2. Estimate biomolecules qualitatively 3. Understand various parameters of haematology 4. Learn about principle and working of instruments in laboratory |

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III Year

| COURSE TITLE | COURSE LEARNING OUTCOMES |
|--|---|
| GENETICS BSC1Y348 <i>Paper-I</i> | <i>After the completion of the course, students should be able to understand-</i> <ol style="list-style-type: none">1. Mendel's laws of inheritance2. Nucleic acid- DNA, RNA and their replication, significance, and role in protein synthesis3. Linkage, Crossing over, Variations and Mutations4. Chromosomes, Sex Determination and Genetic Diseases5. Human Genome Project, Gene Therapy, DNA Fingerprinting, PCR and Blotting techniques6. Recombinant DNA technology and Gene Cloning |
| ECOLOGY AND APPLIED ZOOLOGY BSC1Y349 <i>Paper-II</i> | <i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Basic concepts of ecology and environment2. Different types of habitats e.g. Fresh water, Marine and Terrestrial3. Pollution, wild life and conservation strategies4. Economic aspects of zoology like sericulture, lac culture and aquaculture5. Common pests of grains and vegetables and their biological control |
| LAB WORK (PRACTICAL) BSC1Y348(P) <i>Practical</i> | <i>At the end of the lab work, a student will be able to-</i> <ol style="list-style-type: none">1. Study fresh water, marine and terrestrial fauna2. Study common stored grain and vegetable pest3. Analyse dissolve oxygen, pH, hardness and turbidity of water4. Maintain aquarium5. Working of instruments- Cetrifuge, Eletrophoresis, pH meter, Colorimeter, Spectrophotometer6. Life cycle of Silkworm, Honey bee and Lac insects7. Problems related to Genetics |



Master of Science in Zoology

Program Specific Outcomes

Upon completion of M.Sc. Zoology program, students will be able to-

1. Understand basics of Animal Sciences
2. Get learn about practical knowledge of various aspects
3. Understand morphology, physiology, cytology, development and associated disciplines of subject
4. Learn about new innovations in Animal Sciences
5. Get career opportunities in research, academics and related fields
6. Create, apply and disseminate knowledge leading to innovation
7. Work in teams, facilitating effective interaction in work places



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I Semester

| COURSE TITLE | COURSE LEARNING OUTCOMES |
|--|--|
| STRUCTURE AND FUNCTION OF INVERTIBRATE MSC017 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Understand concept of coelom and development of mouth through blastopore2. Learn about locomotion, feeding and digestion in lower and higher Metazoans3. Know about respiration, excretion and nervous system in Invertebrates4. Learn about larval forms and their significance5. Understand organisation and characters of Minor Phyla |
| BIOSTATISTICS BIOINFORMATICS AND RESEARCH METHODOLOGY MSC018 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Learn about mean, median, mode and Chi Square Test2. Understand ANOVA, correlation & regression3. Learn about basics of computers, operating systems and softwares4. Studied about database management and bioinformatics tools5. Learn about research methodology |
| CELLULAR AND MOLECULAR BIOLOGY MSC019 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Know about structure and function of bio-membranes and cytoskeleton2. Understand about cellular junctions, adhesion and Signal Transduction3. Get knowledge about structure and function of neuron, glial cells and muscles4. Understand about organisation of gene and genome and gene regulation5. Get knowledge about sex determination and dosage compensation |

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| COURSE TITLE | COURSE LEARNING OUTCOMES |
|--|---|
| TOOLS AND TECHNIQUES FOR BIOLOGY MSC020 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Learn about principle and applications of Microscopy and Photometry2. Learn about principle and applications of Separation techniques and Radiography3. Have knowledge about Immunodetection and Histological techniques4. Learnt about Cytological and Molecular techniques5. Know about Tissue Culture techniques |
| INVERTEBRATES, QUANTITATIVE BIOLOGY & BIOINFORMATICS (PRACTICAL) MSC021 | <i>At the end of the lab work, a student will be able to-</i> <ol style="list-style-type: none">1. Identify and mount structural parts of invertebrates2. Study museum specimens of invertebrate animals3. Digitally dissect animals for demonstration of various internal structures : Starfish, Echinus, Holothuria, Pheretime, crab, <i>Squilla</i>, Grasshopper, Cockroach, Scorpion, <i>Mytilus</i>, <i>Octopus</i>, <i>Loligo</i>, <i>Sepia</i>, <i>Aplysia</i>.4. Study permanent slides of invertebrate animal materials5. Learn computer applications and solve statistical problems6. Do case study of biological population7. Construct mathematical models for simple zoological activities |
| MOLECULAR CELL BIOLOGY, GENETICS AND TOOLS & TECHNIQUES (PRACTICAL) MSC022 | <i>At the end of the lab work, a student will be able to-</i> <ol style="list-style-type: none">1. Apply Microtomy for invertebrate and vertebrate materials2. Study permanent slides of cytology3. Separate and detect dyes/amino acids/sugars using Paper Chromatography and/or TLC4. Study cell division and special type of chromosomes by squash preparation5. Collect <i>Drosophila</i> for the study of morphological characters of males and females |

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II Semester

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| GENERAL AND COMPARATIVE ANIMAL PHYSIOLOGY MSC2106 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Understand Cardiovascular System, Blood, Haemopoiesis and Cardiac Cycle2. Study respiratory, digestive and excretory system with their regulation3. Know thermoregulation and physiology of nerve impulse conduction4. Know comparative account of receptor organs5. Learn endocrine system and regulation of hormones |
| BIOMOLECULES, STRUCTURE AND FUNCTIONS MSC2107 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Know structure of proteins & nucleic acids2. Learn carbohydrate metabolism and pentose Phosphate Pathway3. Understand lipids, their storage, metabolism and protein synthesis4. Learn biosynthesis of amino acids, nucleotides and lipids5. Understand Enzyme Kinetics and Concept of Free Energy |
| POPULATION ECOLOGY AND ENVIRONMENTAL BIOLOGY MSC2108 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Understand conservation of biodiversity & population ecology2. Learn adaptations and Biomes3. Know ecological Succession and Homeostasis4. Get information about inter & intra species relationships and pollution5. Know sustainable development and ecological modelling |
| BIOSYSTEMATICS, TAXONOMY AND EVOLUTION MSC2109 | <i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Understand concept of biosystematics and taxonomy2. Learn about taxonomic categories3. Get knowledge about taxonomic procedures and evolution4. Learn about Population Genetics & Zoo - Geological Time Scale5. Understand molecular evolution & phylogenetics |

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| COURSE TITLE | COURSE LEARNING OUTCOMES |
|--|---|
| PHYSIOLOGY AND BIOCHEMISTRY (PRACTICAL) MSC2110 | At the end of the lab work, a student will be able to- <ol style="list-style-type: none">1. Detect carbohydrates, proteins, lipids and urea in the given sample2. Demonstrate salivary digestion3. Count Red Blood & White Blood corpuscles in the blood of man4. Determine haemoglobin percentage in the blood of man5. Detect blood groups, Rh factor, blood clotting time and ESR in man6. Separate Serum and tissue protein |
| ECOLOGY, ENVIRONMENTAL PHYSIOLOGY, SYSTEMATICS, TAXONOMY AND EVOLUTION (PRACTICAL) MSC2111 | At the end of the lab work, a student will be able to- <ol style="list-style-type: none">1. Analyse water for dissolved oxygen, free carbon-dioxide, chloride, pH, hardness and alkalinity2. Know composition and classification of soil, gravel, coarse and fine sands, clay, sand, clay loam, loam, chalky and peaty3. Study Ecological Niche, Animal Association and Communities and Population dispersion4. Identify and classify important invertebrate groups5. Identify structural adaptations of ecological significance |



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III Semester

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|--|--|
| COMPARATIVE ANATOMY OF VERTEBRATES MSCC056301 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Know about Chordates and their origin2. Learn about respiration and blood circulation among vertebrates3. Know about skeletal and urinogenital system of vertebrates4. Understand comparative anatomy of nervous system and sense organs5. Get informed about adaptations in vertebrates |
| DEVELOPMENTAL BIOLOGY MSCC056302 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Learn about cell commitment, differentiation and gametogenesis2. Know about pre and post fertilization events3. Understand hormonal regulation and Cryopreservation of embryo4. Know about effects of Xenobiotics and Melanogenesis5. Learn about cell diversification and stem cells |
| METHODS IN CELL AND MOLECULAR BIOLOGY MSCC056307 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Understand principal and application of Spectrophotometer and Fluorimeter2. Know about Cell Fractionation and Crystallography3. Know about Immunetechniques and DNA - Protein Interactions4. Know about Gene Analysis and RDT5. Get knowledge about Genome and RNA analysis |
| CELLULAR STRUCTURE AND MOLECULAR ORGANIZATION MSCC056308 | <i>After the completion of the course, students will be able to-</i> <ol style="list-style-type: none">1. Know about cloning vectors and genome complexity2. Know about Cytochemistry of Golgi complex, Peroxisomes and Nucleolus.3. Learn about secretory pathways of secretory proteins and cell cycle regulation in <i>Xenopus</i> and <i>Yeast</i>4. Learn about Cell Signalling and Apoptosis5. Know about Oncogenes and Cancer |

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| COURSE TITLE | COURSE LEARNING OUTCOMES |
|--|---|
| VERTEBRATES AND GENES, DEVELOPMENT & DIFFERENTIATION (PRACTICAL) MSCC056313 | <i>At the end of the lab work, a student will be able to-</i> <ol style="list-style-type: none">1. Classify lower chordates and study representatives of various groups2. Dissect and stain lower chordate animals3. Study permanent slides of Urochordata, Cephalochordata and various vertebrates4. Study disarticulated skeleton of various vertebrates5. Study important characters of poisonous & non-poisonous snakes and their biting apparatus6. Study electron micrographs of spermatogenesis and oogenesis7. Study permanent slides of chick and frog gonads and embryology |
| CELL BIOLOGY-I (PRACTICAL) MSCC056314 | <i>At the end of the lab work, a student will be able to-</i> <ol style="list-style-type: none">1. Study Microtomy and Cryotomy, staining and detection of cell organelles2. Do Gel electrophoresis of proteins: Separation of Proteins on Polyacrylamide Gel Electrophoresis (PAGE)3. Study human karyotype4. Study permanent slides and electron micrographs |



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IV Semester

| COURSE TITLE | COURSE LEARNING OUTCOMES |
|---|---|
| ANIMAL BEHAVIOR MSSC056401 | <i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Know about behavioural patterns, reflexes and complex behaviour2. Learn about motivation & communication3. Understand rhythm, learning and memory4. Know about reproductive and social behaviour5. Learn about control of behaviour |
| BIOLOGY OF PARASITISM AND VERTEBRATE IMMUNE SYSTEM MSSC056402 | <i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Know about concept of parasitism and host parasitic relationship2. Know about host reaction to parasites and cells of immune system3. Learn about antigen- antibody interaction and T- cell response4. Learn about humoral immunity and complement system5. Get knowledge about vaccines and immunodeficiency disorders |
| NEUROBIOLOGY AGEING MSSC056407 | <i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Know about organization of nervous system2. Learn about neurotransmitters and signaling3. Get informed about types, structure and functions of glial cells4. Understand sensory and motor system5. Get knowledge about ageing and associated neurodegenerative disorders |
| CHROMOSOME, GENES AND GENETICS OF DEVELOPMENT MSSC056408 | <i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Understand molecular organization of eukaryotic chromosome2. Learn about organization of gene and gene families3. Know about mechanism of transcription in eukaryotes4. Learn about DNA amplification in Protozoans, Drosophila & Xenopus5. Get knowledge about development in Drosophila and homeotic mutation |

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| COURSE TITLE | COURSE LEARNING OUTCOMES |
|---|---|
| ANIMAL BEHAVIOUR, BIOLOGY OF PARASITISM & VERTEBRATE IMMUNE SYSTEM (PRACTICAL) MSCC056413 | <i>At the end of the lab work, a student will be able to-</i> <ol style="list-style-type: none">1. Understand animal behaviour2. Prepare and identify blood film and cells3. Study protozoan and helminth parasites, parasitic adaptation in animals, parasitic invasions, host-parasite interaction4. Study Immune Techniques: Immunodiffusion, ELISA and Immunoelectrophoresis |
| CELL BIOLOGY-II (PRACTICAL) MSCC056414 | <i>At the end of the lab work, a student will be able to-</i> <ol style="list-style-type: none">1. Study cell division (mitosis and meiosis) and special type of chromosomes by squash preparation2. Study chromatophores3. Study immune cells in cytological preparation4. Study monohybrid crosses and dihybrid crosses |

(Shri Vikas Pitre)
HOD
Department of Zoology

(Dr. Niranjan Shrotriya)
CO-ORDINATOR, IQAC
Govt. Postgraduate College,
Guna (M.P.)

Govt PG College, Guna (MP)

(Dr. B.K. Tiwari)
PRINCIPAL
Govt. Postgraduate College,
Guna (M.P.)