Department of Zoology

Programme Outcomes (PO)

After the completion of B.Sc. Honours Degree Programme, the students will be able to achieve the following outcomes:

1: Professional knowledge: Acquire comprehensive knowledge of major concepts, theoretical principles and experimental findings of various subjects in pure sciences.

2: Critical thinking and Cognitive skills: Convey the intricate science information effectively and efficiently, analyse and solve the problems related to plants, animal sciences without relying on assumptions and guesses.

3: Environment and sustainability: Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

4: Effective Communication: Demonstrate familiarity with and will be able to analyse both verbally and in writing issues and forms of contemporary art with a clear understanding of historical precedents.

5: Instruments and Experiments: Acquire the skills in handling scientific instruments, planning and performing in laboratory experiments and drawing logical inferences from the scientific experiments.

6: Research and Analysis: Demonstrate analytical skill and proficiency in a range of tools and techniques used in research in science and interdisciplinary programmes.

7: Employability and higher Education: Show proficiency in professional, employability and develop soft skills required for higher education and placements.

8: Ethics: Imbibe ethical, moral and social values in personal and social life leading to highly cultured and civilized personality in the field of science.

9: Science and Society: Apply reasoning acquired by the scientific knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional science practice.

10: Interdisciplinary Learning: Integrate academic curriculum with other co- curricular goals, such as career development, life-long learning, develop interdisciplinary learning and opportunity to extend their knowledge across all disciplines.

11: Nation Building: Introspect and evolve into dynamic and creative individuals capable of socially productive, constructive actions that positively impact our Nation and the World at large.

H. O. D.

Programme Specific Outcomes (PSO)

After the completion of B.Sc. Honours Degree Programme, the student will be able to:

1. Identify, classify and differentiate diverse chordates and non-chordates based on their morphological, anatomical and systemic organization.

2. Describe economic, ecological and medical significance of various animals in human life. This will create a curiosity and awareness among them to explore the animal diversity and take up wild life photography or wild life exploration as a career option. The knowledge about identifying and classifying animals will provide student professional advantages in teaching, research and taxonomist jobs in various government organizations; including Zoological Survey of India and National Parks/Sanctuaries.

3. Acquire practical skills in cell & molecular biology, biochemistry, genetics, enzymology These methodologies will provide an extra edge to our students, who wish to undertake higher studies.

4. Understand comparative anatomy and developmental biology of various biological systems; and learning about the organisation, functions, strength and weaknesses of various systems will let student critically analyse the way evolution has shaped these traits in human body.

5. Skill enhancement course like medical diagnostics will provide them opportunity to work in diagnostic or research laboratory.

6. Student undertaking wild life management courses would gain expertise in identifying key factors of wild life management and be aware about different techniques of estimating, remote sensing and Global Positioning of wild life. This course will motivate student to pursue career in the field of wildlife conservation and management.

7: Acquire awareness towards gender, environment, sustainability, human values, and professional ethics and understand the difference between acting, responding, reacting to various social issues.

Outcomes of the courses according to CBCS Syllabus

SEMESTER I
Core I
Non-Chordates I :Protists To Pseudocoelomates

Course Outcome:

On completion of the course student will be able to:

H.O.D.

1-Learn & interpret the importance of taxonomy and classify Protista, Parazoa, Metazoa, Porifera, Cnidaria, Platyhelminthes and Nemathelminthes.

2- Understand and explain the economic importance and describe the life cycle and pathogenecity of P. vivax, E. histolytica, Schistosoma haematobium, Taenia solium, Ascaris lumbricoides and Wuchereria bancrofti.

3- Appreciate the diversity and complexities exhibited by non-chordates and familiarize with the morphology, anatomy and functioning of different groups of non-chordates.

4- Critically analyse the organization, complexity and adaptations in parasitic Nemathelminthes and Platyhelminthes; affinities and Evolutionary significance of Ctenophora and to enhance collaborative learning through practical sessions, assignments and projects.

Core II

Principles of Ecology

Course Outcome:

On completion of the course student will be able:

1- Understand and relate the key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors.

2- Understand and explain the population attributes; population growth models and population interactions and to understand and describe the community characteristics and ecological succession.

3- Understand and describe the different ecosystems, food chains, energy flow & efficiency; biogeochemical cycles.

4- Learn and relate the application of the basic principles of ecology in wildlife conservation and management.

SEMESTER – II

CORE III :

Non-chordates II: Coelomates

Course Outcome:

On completion of the course student will be able to:

1- Classify and compare phylum Annelida, Arthropoda, Mollusca and Echinodermata.

1- Understand and describe Excretion in Annelida; Vision and Respiration in Arthropoda; Metamorphosis in Insects; Social life in bees and termites.

A.O.D.

3- Understand and describe Respiration in Mollusca; Torsion and detorsion in Gastropoda; Pearl formation in bivalves.

4- Understand and describe the Water-vascular system in Asteroidea; Larval forms in Echinodermata.

CORE IV :

Cell Biology

Course outcome:

On completion of the course student will be able to:

1- Understand the structures and purposes of basic components of Prokaryotic and Eukaryotic cells.

2- Understand the structures and functions of Plasma Membrane, Endomembrane System and Cytoskeleton.

3- Understand the detailed structure of Mitochondria and how energy is produced by it through the Respiratory chain.

4- Understand the detailed structure of Nucleus and its associated structures, Cell Division, Cell Cycle and Cell Signalling.

SEMESTER - I

ZOO GE 1 :

Animal Diversity

Course outcome:

On completion of the course student will be able to:

1- Understand and describe the features of Protista, Porifera, Radiata, Acoelomates and Pseudocoelomates.

2 - Understand and describe the features of Arthropoda, Mollusca and coelomate deuterostomes.

3- Understand and describe the features of Protochordates, Pisces and Amphibia.

4- Understand and describe the features of Reptiles, Aves and Mammalia.

SEMESTER – II

ZOO GE 2 :

Environment and Public Health

H.O.D.

Course outcome:

On completion of the courses student will be able to:

1- Acquire knowledge about various sources of environmental hazards, their risk assessment, fate of toxic and persistent substances in the environment.

2- Understand the factors of Climate change like Greenhouse gases, Global warming, Acid rain, Ozone layer destruction and Effect of Climate change on public health.

3- Know about the sources and effects of Air, Water and Noise Pollution and their control methods, Waste Management Technologies, Bhopal Gas Tragedy, Chernobyl Disaster, Seveso Disaster and Three Mile Island Accident and their aftermath.

4- Understand the causes, symptoms and control of Diseases like- Tuberculosis, Asthma, Silicosis, Asbestosis, Cholera, Minamata, Arsenicosis and Fluorosis.

SEMESTER – III

CORE V :

Diversity of Chordates

Course outcome:

On completion of the courses student will be able to:

1- Understand the General Characteristics and Classification of Hemichordata, Urochordata and Cephalochordata, the Larval forms of Protochordata and Retrogressive Metamorphosis in Urochordata.

2- Acquire knowledge about the General Characters and Classification of Agnatha, Pisces and Amphibia.

3- Understand the General Characteristics and Classification of Reptilia, Aves and Mammals, Biting Mechanism in Snakes, Flight Adaptations in Birds and Migration in Birds.

4- Know about the Zoogeographical Realms and Characteristic Fauna.

CORE VI :

Animal Physiology: Controlling and Coordinating Systems

Course outcome:

On completion of the courses student will be able to:

1- Know about different types of Tissues, Bone and Cartilage, Muscles and physiology of Muscle Contraction.

2- Acquire knowledge about the structure and function of Nervous System.

H.O.D.

3- Understand the Histology and physiology of Male and Female Reproductive System.

4- Learn about the Histology and Physiology of human Endocrine System and Associated Diseases.

CORE VII :

Fundamentals of Biochemistry

Course outcome:

On completion of the course student will be able to:

1- Understand the Structure, Classification and Importance of Carbohydrates and Proteins.

2- Understand the Structure and Significance of physiologically important Lipids.

3- Understand the Basic Structure and Types of DNA and RNA, Base pairing, Denaturation and Renaturation of DNA.

4- Understand the Types of Enzymes, Mechanism of Enzyme Action and Enzyme Kinetics

SEMESTER – IV

CORE VIII :

Comparative Anatomy of vertebrates

Course outcome:

On completion of the course student will be able to:

1- Describe the function and derivative of integument

2- Explain the Evolution of heart and aortic arches

3- Compare structure and function of the Alimentary canal and associated glands

4- Evaluate the techniques relating to the nervous system and how they within the body respond to challenges.

CORE IX :

Animal Physiology: Life Sustaining Systems

Course outcome:

On completion of the course student will be able to:

1- Compare the mechanical and chemical digestion of food

H. O. D.

2-Remember and understand hormonal control of secretion of enzymes in gastrointestinal tract .

3- Acquire knowledge of mechanism of breathing, Pulmonary ventilation and its control and to understand the concept of hemostasis and blood clotting system.

4- Explain origin and conduction of cardiac impulses and cardiac cycles.

CORE X :

Biochemistry of Metabolic Processes

Course outcome:

On completion of the course student will be able to:

1- Compare catabolism Vs Anabolism, Compartmentalization of metabolic pathways and membrane transporters

2- Construct a flowchart for the steps involved in sequence of reactions of glycolysis, citric acid and pentose phosphate pathway

3- Acquire a comprehensive knowledge of β – oxidation of saturated fatty acids

4- Understand the transamination and determination.

SEMESTER -V

CORE XI :

Molecular Biology

Course outcome:

On completion of the course student will be able to:

1- Understand Central dogma of molecular biology. Explain and distinguish mechanism of replication, transcription and translation in prokaryotes and eukaryote

2- Understand and explain the post transcriptional modifications in eukaryotes.

3- Explain and differentiate the mechanism of gene expression and regulation in prokaryotes and eukaryotes

CO4- Describe the concept of regulatory RNAs, Ribo-switches and RNA interference and to enhance skill in molecular biology through relevant experiments.

H.O.D.

CORE XII :

Principles of Genetics

Course outcome:

On completion of the course student will be able to:

1- Explain and discuss the genetic variation through linkage and crossing over.

2- Describe sex-linked, sex limited and sex influenced inheritance.

3- Understand the Concept behind genetic disorder, gene mutations and molecular basis of mutations and to explain the criteria for extra-chromosomal inheritance.

4- Describe the molecular mechanisms of recombination in bacteria and to explain and distinguish the concept of transposable genetic elements in prokaryotes and eukaryotes. Solve genetic based problems.

ZOO DSE I :

Endocrinology

Course outcome:

On completion of the course student will be able to:

1- Describe and of types of endocrine glands, classify hormones and explain their features.

2- Explain structure, functions and regulation of peripheral endocrine glands and associate function of neuroendocrine system, epiphysis, and hypothalamo-hypophysial axis.

3- Understand the mechanism of regulation of hormone action hormone action at cellular level and gain the knowledge of hormone receptors.

4- Apply the knowledge by performing biochemical assays to detect level of hormones in plasma and visualize cross sections of endocrine glands.

OR

Animal Behaviour and Chronobiology

Course outcome:

On completion of the course student will be able to:

1- Understand various pattern of animal behaviours such as stereotyped, instinct, learnt, associative behaviour along with operant conditioning and habituation imprinting and to explain the concept of social and sexual behaviour.

H. O. D.

2- Provide the concept of biological rhythm, photoperiod and regulation of seasonal reproduction of vertebrates and role of melatonin.

3- Understand the relevance of biological clock in terms of chronopharmacology, chronomedicine and chronotherapy.

4- Develop the skill in this course by performing practical works such as studying nest and nesting habitat of birds and social insects and other significant experiments.

ZOO DSE II :

Immunology

Course outcome:

On completion of the course student will be able to:

1- Explain cells and organs of the immune system, innate and adaptive immunity.

2- Describe autoimmunity with reference to rheumatoid arthritis and tolerance and AIDS.

3- Understand antigens and its type, structure and functions of immunoglobulins, Antigen-antibody interactions and immunoassays (such as ELISA and RIA).

4- Explain structure and functions major histocompatibility complex, know the concept of hypersensitivity and vaccines.

SEMESTER-VI

CORE XIII :

Developmental Biology

Course outcome:

On completion of the course student will be able to:

1- Describe the mechanism of gametogenesis, fertilization and blocks to polyspermy.

2- Explain early embryonic development in frog and chick.

3- Understand the concepts of late embryonic development in model organisms.

4 - Describe post embryonic development such as metamorphosis and regeneration with suitable examples and apply important experiments and project work.

H.O.D.

CORE XIV :

Evolutionary Biology

Course outcome:

On completion of the courses student will be able to:

1- Understand the basis of origin of life such as: chemogeny, RNA world, biogeny and evolution of eukaryotes.

2- Obtain the various evolutionary concepts and heritable variation and to understand concept of species, isolating mechanisms, modes of speciation and adaptive radiation.

3- Explain and different types of fossils, geological time scale, climatic conditions, hominid characteristics, primate phylogeny and evolution of horse and man.

4- Understand Hardy-Weinberg principle of genetic equilibrium and its destabilizing forces such as Natural selection, Mutation, Migration and genetic drift.

ZOO DSE III:

Wild Life Conservation and Management

Course outcome:

On completion of the course student will be able to:

CO1- Understand different physical and biological parameters for evaluation and management of wild life.

CO2- Get the knowledge of Grazing logging, cover construction, preservation of genetic diversity and restoration of degraded habitats under management of habitats.

CO3- Estimate Population density, Natality, Birth rate, Mortality and fertility schedules.

CO4- Get the concept of climax persistence, Rescue and rehabilitation, Quarantine, Common disease of wild animal and Man – Animal conflict and to enhance exposure through visit to Wild life Sanctuary, Biodiversity Park and Zoological Parks .

OR

Fish and Fisheries

Course Outcomes:

On the completion of the course, students will be able to:

• Understand fisheries sector and its contribution in nutrition and socio-economic growth.

H.O.D.

- Know different types of fisheries practiced in Indian subcontinent.
- Be familiar with major fisheries resources of India.
- Gain basic knowledge of prawn and pearl culture.
- Learn elementary idea of fish by products and their uses.
- Practice methods of processing and preservation of fishes for profitable outcome of fisheries.

Outcomes of the courses according to NEP Syllabus

Semester I

Core I

Invertebrates: Protista to Echinodermata

Programme Specific Outcome:

- Understand the general characteristics of non-chordate groups of organisms.
- Acquire knowledge regarding classification of the taxa with examples.

Develop an understanding of important phenomena associated with each taxon.

- Acquire skills in identifying representative species of groups studied.

Illustrate phylogenic distribution of lower groups of Non-chordates.

-
- Obtain an over view of the general features, respiration, Gastropodan evolution, mechanism of torsion, and significance of larval life stages.
- Acquire knowledge on general characters and classification of Echinoderms and their affinities with Chordates.

Course Outcome:

- Utilize information to understand the differences of the groups studied.
- Develop skills in examining diversity of the taxa.
- Develops skills in elaborating the general features and evolutionary significance of the coelomate from Annelida to Echinoderms.
- Impactful visual understanding and enables the students to correlate the evolutionary significance of each organism on the phylogenetic tree.
- Study on various general features and characteristics of body symmetry and arrangement with various vision types, excretory systems and developmental stage give a strong fundamental understanding on the subject on Coelomates.

H.O.D.

Core II

Diversity of Chordates: Protochordates to Mammalia

Programme Specific Outcome:

- The students learn about the salient features, diversity and distribution of all Chordates.
- To know the evolution of aquatic, amphibious and terrestrial vertebrates.
- To understand the importance of distribution of vertebrates in different realms.

Course Outcome:

- Understanding the origin, larval forms, distribution and adaptation of different vertebrates.
- Accumulating the knowledge and understanding on the classification, affinities and comparative anatomy of different vertebrates and their evolutionary significance.
- Learning the mechanism of flight and aquatic adaptations in birds and mammals.
- Obtaining knowledge pertaining to the distribution of animals particularly vertebrate in different realms.

Semester II

Core III Microbiology

Programme Specific Outcome:

- Knowledge of microbial diversity and classification.
- To understand microbial culture, growth and reproduction.
- To understand the importance of viral pathogenicity, nature of viral transmission.
- To comprehend the importance of Anti-viral drugs and vaccines.

Course Outcome:

- Obtaining knowledge pertaining to future scopes and modern trends of microbiology.
- Understanding the experimental approaches to explore the origin of microbes.
- Understanding the morphology, classification and significance of host-vector relationship.
- Learning the mechanism of action of microbial toxins and pathogenicity.
- Obtaining knowledge on pathogenic manifestation of Oncoviruses & HIV.

Core-IV

Cell Biology

Programme Specific Outcome:

- Introducing prokaryotic and eukaryotic cells and their features, ultrastructure of plasma membrane and mechanism of transport of molecules across plasma membrane.

H.O.D.

• To know the structure, function and properties of endomembrane & cytoskeletal network system and cell organelles.

• To understand the importance of mitochondria in aerobes, the role of mitochondrial electron transport chain, oxidative phosphorylation & mechanism of ATP synthesis.

• To study the structure and packaging of chromosome in nucleus, behaviour of chromosome during cell division, cell cycle and its regulation.

Course Outcome:

• Understanding the difference between prokaryotic and eukaryotic cells and the mechanism of transportation across their membrane system.

• Understanding the role of cytoskeleton in maintaining structural frame work, cell motility and cell organelles.

• Deciphering the role of mitochondria in cellular respiration and energy production.

• Obtaining knowledge on structure and function of nucleus, cell division and regulation of cell cycle.

Semester-III

Core-V
Principles of Ecology
Programme Specific Outcome:

• Understand the concept of an ecosystem, its attributes, factors and functioning.

• Learn about population attributes, growth patterns, strategies; regulation and interactions.

• To appraise learners regarding various community characteristics.

• Comprehend biological data, learn graphical representation of data, sampling techniques, grasp basic statistics.

• Acquire skills on plotting survivorship curves, quadrate method of determining population density, diversity indices, techniques of preservation and mounting of plankton, determination of ecological parameters.

Course Outcome:

• Utilize information to understand interrelations and working of an ecosystem.

• Demonstrate the ability to comprehend data, plot graphs, present data and apply basic statistics.

H.O.D.

Core-VI

Physiology: Controlling and Coordinating systems

Programme Specific Outcome:

• Develop an understanding of tissues and tissue systems with clarity on types and functions of each.

• Acquire knowledge on the muscle and nervous system.

• Obtain information about various receptors, their functioning and understand the mechanism of action.

Course Outcome:

• Acquire skills in differentiating tissues based on their structure and functions.

• Gain insights on the controlling and coordinating systems of the body.

Core VII

Fundamentals of Biochemistry

Programme Specific Outcome:

• To gain understanding of fundamentals of biochemistry and biological macromolecules.

• To understand structure, classification, properties and significance of biomolecules.

• Acquire knowledge on nomenclature, classification and mechanism of enzyme action, regulation and its kinetics.

Course Outcome:

• To understand the structure and biological importance of protein, carbohydrates, lipids, nucleic acids and enzymes.

• Providing knowledge on types of amino acids and its polymeric form.

• Learning the structure and pairing of nucleotides, denaturation and denaturation kinetics of DNA.

• Obtaining knowledge on enzymes and isoenzymes, specificity, inhibition, derivation of Michaelis-Menten equation.

Semester-IV

Core VIII

Endocrinology & Reproductive Biology

Programme Specific Outcome:

• Insights on the history of endocrinology, study endocrine glands, hormones, control and regulation

H.O.D.

• Acquire knowledge on the various facets of the reproductive system and their endocrine aspects.

Course Outcome:

• Essential clarity on endocrine gland structures, hormones, functions and their regulation.

• Scientific knowledge base on reproductive health and endocrine control.

Core IX

Comparative Anatomy of Vertebrates

Programme Specific Outcome:

• Understand anatomical significance of organ system in vertebrates.

• Comprehend structure, function and various derivatives of Integumentary, Skeletal, digestive, respiratory, circulatory, urinogenital and nervous system.

Course Outcome:

• Learner gains detailed overview of the anatomical resemblance amongst vertebrates hierarchies.

• Acquires knowledge on cellular development of organ systems in the vertebrates and linear progression of cellular derivatives during organogenesis.

• Understand the process of linear and vertical cellular evolutionary processes.

Core X

Physiology: Life Sustaining Systems

Programme Specific Outcome:

• Knowledge of critical physiological processes.

• Understand anatomical attributes of Digestive, Respiratory, Renal and Cardiovascular system.

• Learn and develop an understanding of vital life-sustaining physiological processes.

Course Outcome:

• Appraise the significance of anatomical structures and physiological events.

• Apply information to understand the functioning of organisms.

• Demonstrate the ability to appreciate the occurrence of physiological actions.

• Understand interrelationships of life processes.

•Acquire practical skills in identifying different organs, and perform laboratory work based on theoretical applications

H.O.D.

Semester-V

Core XI

Biochemistry of Metabolic Processes

Programme Specific Outcome

- Understanding of catabolism, anabolism and regulatory mechanism of intermediary metabolism.
- To learn the processes of carbohydrate, lipid and protein metabolism.
- To obtain knowledge on redox regulation and electron transport system.

Course Outcome:

- Gain overall knowledge and understanding on metabolic pathways and shuttle systems.
- Gain knowledge on carbohydrate metabolism related processes.
- Understanding of β-oxidation and catabolism of amino acids.
- Understanding on mitochondrial respiratory chain and oxidative phosphorylation.

Core XII

Principles of Genetics

Programme Specific Outcome:

- Obtain knowledge on the basic principles of genetics.
- To provide knowledge on the mechanism of sex determination and extra-chromosomal inheritance.
- To learn the process of DNA recombination, transposons and transposable elements.

Course Outcome:

- Acquire knowledge on the fundamentals of Mendelian and non-Mendelian genetics, chromosomal mapping and interaction of genes.
- Providing the knowledge and understanding on linkage, crossing over, sex determination and role of extra-chromosomal inheritance.
- Obtaining knowledge on chromosomal aberration, cause and consequences of mutations.

Core XIII

Molecular Biology

Programme Specific Outcome:

- Detailed information on DNA structure, different forms, their properties and types of RNA.
- Understanding mechanism of DNA replication and repair in prokaryotes and eukaryotes.

H. O. D.

• Gain knowledge on mechanism of transcription and translation in prokaryotic and eukaryotic cells.

• Acquire knowledge on post transcriptional modifications of RNA.

Course Outcome:

• Gain knowledge on details of Watson-Crick Model of DNA, RNA types .

• Understand the process of DNA replication, transcription, translation and their regulatory mechanisms.

• Gain knowledge on genetic code & regulatory machinery.

• Understand gene expression and role of RNA interference elements.

Semester-VI

Core XIV

Developmental Biology

Programme Specific Outcome:

• Understand the phases of development, changes, regulation and the concepts of ageing and teratogenesis.

• Gain knowledge on In- Vitro fertilization and amniocentesis.

Course Outcome:

• Understand the basic concepts of gametogenesis, fertilization and embryogenesis.

• Gain knowledge on interferences in developmental biology.

Core XV

Taxonomy and Evolutionary Biology

Programme Specific Outcome:

• Familiarize learners with concepts of Taxonomy.

• Gain overview of the beginning of life and evolutionary theories.

• Understand various physical forces or stress pressures during evolution.

• Gain knowledge on correlates of epigenetic changes in the cellular footprints of animals and genetic lineages exerted through various physical forces.

• Comprehend the origin of evolution in Hominides with reference to Primates, validate evidence of human origin by molecular and phylogenetic sequence analysis.

Course Outcome:

• Understand concepts of taxonomy.

Obtain knowledge of life initiation and its evolution through the chronological landscape.

• Know the evolutionary relationship of organisms with response to various physical forces leading to adaptive evolution.

• Strengthen student's analytical approach to evolutionary relationships.

H.O.D.

Semester VII

Core XVI Instrumentation and Techniques

Programme Specific Outcome:

- The programme will impart the basic understanding on instrumentation and techniques.

- Students will gain knowledge on working principles of scientific equipment's.

- Programme strengthens student's skills in handling laboratory equipment's and performing experiments.

Course Outcome:

- Insights into basic understanding of instruments and their operational principles.

- Students will gain knowledge on principles of centrifugation, and chromatographic techniques like Paper chromatographic, TLC, Column chromatography (GC, GEC, Ion-exchange, affinity and HPLC).

- Course will strengthen the learners on basic techniques on gel electrophoresis and blotting.

Core XVII

Biostatistics and Bioinformatics

Programme Specific Outcome:

- The programme gives the information to students on concepts of biostatistics and bioinformatics.
- The knowledge of biostatistics gives the dynamics application of population sampling methods and utilities through various methods and statistical tools.
- The study of bioinformatics will impart the deep knowledge on various informatics tools and web resources for analysis of cellular biomolecules.

Course Outcome:

- To understand the various methods of sampling towards qualitative and quantitative analysis of its distributions in population.
- Students will be acquainted with the measures of central tendency and dispersion through mean, median and mode.
- Learners will be able to understand the function and application of probability distribution, hypothesis testing and principal component analysis.
- This course will make the students understand the biological data bases through various web resources by studying bioinformatics.

H. O. D.

Core XVIII

Animal Biotechnology

Programme Specific Outcome:

• Acquires knowledge on animal biotechnology.

• Gain knowledge of techniques in molecular biology and genetic engineering.

• Skills learners on methods of animal cell culture, Recombinant DNA technology and gene therapy.

Course Outcome:

• Students gain understanding of cloning vectors, restriction enzymes, genomic and cDNA libraries.

• Understand the process and applications of genetically modified organisms/ animals.

Core XIX

Immunology

Programme Specific Outcome:

• Imparts the knowledge of immunological defence system of human body.

• Understand the type and functions of various immune cells.

• Learner gain knowledge on primary functions of immune system and role of vaccine in combating disease.

Course Outcome:

• Knowledge on types and cells of immune system and their functions in physiological defence against pathogens.

• Understand the functions of various antigens and immunoglobins in cellular response.

• Learners gain knowledge of structure and function of cell surface and secreted molecules.

• Understand naturally occurring allergens and their role in hypersensitive reactions.

Semester VIII

Core XX

Aquatic Biology and Toxicology

Programme Specific Outcome:

• Acquire knowledge on aquatic biomes

• Gain understanding of the fresh water and marine realm and the factors influencing the systems.

• Obtain information on management of resources associated with such systems.

Course Outcome:

• Skills obtained in estimating environmental parameters in the laboratory.

• Taxonomic basis of identification established.

H.O.D.

• Prepare the students for career in aquatic resources management and sustainable utilization

Core XXI
Wildlife and Conservation Biology
Programme Specific Outcome:

• Understand the significance of wild life conservation.

• Gain knowledge on wild life and the need of habitable environmental parameters.

• Acquire skills on conservation strategies and wild life management.

Course Outcome:

• Gains overview of wild life conservation strategies through various acts and regulatory agencies.

• Strengthens learner's towards understanding scientific approaches to evaluate health status of wild animals and focus man-animal conflicts.

Core XXII Chronobiology & Animal Behaviour
Programme Specific Outcome:

• Trace the origin and history of Ethology; appreciate significant contributions of notable animal behaviour researchers.

• Understand behaviour patterns, comprehend the physiology underlying behavioural expressions, and acquire knowledge regarding field and laboratory study of animal behaviour.

• An understanding of social and sexual behaviour.

• Relate cues to chronobiological events and understand biological rhythms and their significance.

Course Outcome:

• Demonstrate the ability to comprehend and gauge animal behaviour in context.

• Be able to evaluate behaviour with the tools and techniques learned.

H.O.D.

Semester III

MDC ZOO- VERMITECHNOLOGY

Programme specific outcomes:

- **Understanding Earthworm Biology and Culture**: Students gain detailed knowledge of various earthworm species, their life cycles, and the methods required for their culture (vermiculture).
- **Mastery of Vermicomposting Techniques**: Learners become proficient in the practical application of earthworms to convert various organic residues (e.g., kitchen waste, agricultural waste, sewage sludge) into high-quality vermicompost using different methods (pit, bed, heap).
- **Knowledge of Vermicompost Benefits**: Students understand the use and economic importance of vermicompost as a nutrient-rich bio-fertilizer that enhances soil structure, aeration, water retention, and microbial activity, thus reducing the need for chemical fertilizers.
- **Application in Sustainable Agriculture**: Graduates can apply vermitechnology in an integrated approach to improve crop yields, promote organic farming, manage soil health, and contribute to overall ecological and food security.
- **Waste Management and Environmental Remediation**: The program outcome includes the ability to use vermitechnology for effective solid waste processing, wastewater treatment (vermifiltration), and the remediation of chemically contaminated soils (vermiremediation), thereby mitigating environmental pollution.
- **Entrepreneurship and Employability**: Students develop the skills necessary to establish small-scale vermicomposting units, market vermicompost products, and generate self-employment or find jobs in bio-farms and related agro-industries.
- **Adherence to Environmental Principles**: The program emphasizes the principles of the four R's of recycling (Reduce, Reuse, Recycle, Restore) and promoting eco-friendly practices in waste management and agriculture.

Course outcomes:

Upon successful completion of an MDC Vermitechnology course, students can expect the following outcomes:

A.O.D.

- **Understanding Earthworm Biology and Ecology:** Students will gain a basic knowledge of the taxonomy, morphology, anatomy, reproduction, and life cycles of different species of earthworms, including those suitable for commercial vermicomposting like *Eisenia fetida* and *Eudrilus eugeniae*.
- **Mastery of Vermicomposting Techniques:** Students will learn the principles and practical skills for various scales of vermicomposting (household to commercial level), including:
    - Preparation and maintenance of vermibeds/composting pits.
    - Identifying suitable organic waste substrates for composting.
    - Managing environmental parameters like moisture and temperature.
    - Collection, harvesting, and storage of vermicompost and vermiwash.
- **Knowledge of Product Application and Benefits:** Students will understand the physical and chemical properties of high-quality vermicompost and how its application improves soil health, structure, water retention, and microbial activity, leading to enhanced plant growth and crop yields.
- **Environmental Awareness and Waste Management Skills:** The course outcomes emphasize the role of vermitechnology in solid waste management, pollution prevention, and promoting eco-friendly practices (reduce, reuse, recycle, and restore) within the framework of organic farming.
- **Entrepreneurship and Career Skills:** A key outcome is the development of self-employment skills, enabling students to establish and profitably run their own small-scale vermicomposting units, generate income by supplying vermiculture products, and potentially create employment for others in rural areas.

H.O.D.