M.Sc. ZOOLOGY

PROGRAMME SPECIFIC OUTCOME

PSO1: Understand ecological impact on animal behavior and the interdisciplinary relationship of Zoology with physics, Mathematics and Statistics to acquire knowledge and its application in Zoology.

PSO2: Conceive the normal physiological, metabolic processes as well as the embryonic development, to understand the developmental syndromes, metabolic disorders and its hormonal regulation.

PSO3: Understand genetics and analyze the cytogenetic principle considering the advancements in the research in human genome and genomes of other model organisms.

PSO4: Acquire skills to carry out experimental techniques and methods of statistical analysis appropriate for the various biological experimental conditions.

COURSE OUTCOME

SJZOL1C01 : BIOCHEMISTRY AND CYTOGENETICS

SJZOL1C01.1	Recognize structure and functioning of biologically important molecules.
SJZOL1C01.2	Understand the chemistry of Carbohydrates, lipids, amino acids, proteins and nucleic acids in detail.
SJZOL1C01.3	Describe the mechanism of enzyme action and identify the classes of enzymes and factors affecting action
SJZOL1C01.4	Discuss the Laws of Thermodynamics and its relationship to chemical equilibria
SJZOL1C01.5	Describe the metabolism of carbohydrates, lipids and proteins
SJZOL1C01.6	Describe cellular membrane structure and function, fine structure and function of cell organelles.
SJZOL1C01.7	Explain the cell cycle and its regulatory processes
SJZOL1C01.8	Distinguish the communications of cells with other cells and to the environment.
SJZOL1C01.9	Explain the central intracellular signal transduction pathways and the mechanism of cell death.

SJZOL1C02 : BIOPHYSICS AND BIOSTATISTICS

SJZOL1C02.1	Demonstrate knowledge of the fundamental concepts in physics and chemistry that underlie biological processes.
SJZOL1C02.2	Recall and relate the concepts of radioactivity and its applications
SJZOL1C02.3	Recall and explain the techniques and underlying theory of UV- Visible, IR, NMR and ESR and mass spectroscopy
SJZOL1C02.4	Identify and differentiate working principle, instrumentation and applications of various bio-analytical instruments.
SJZOL1C02.5	Understand the application of nanotechnology in health care.
SJZOL1C02.6	Demonstrate an understanding of the central concepts of modern statistical theory and their probabilistic foundation.
SJZOL1C02.7	Recognize the importance of data collection and its role in determining scope of inference.
SJZOL1C02.8	Apply hypothesis testing via some of the statistical distributions.
SJZOL1C02.9	Interpret statistical results correctly, effectively, and in context.

SJZOL1C03 : ECOLOGY AND ETHOLOGY

SJZOL1C03.1	Explain the interaction of organisms with the physical and biological environment.
SJZOL1C03.2	Illustrate the flow of energy through ecosystems with reference to trophic levels and ecological efficiency.
SJZOL1C03.3	Describe population structures and growth, and identify the factors that limit the distribution and abundance of populations.
SJZOL1C03.4	Compare and contrast the effects of competition, predation, and mutualism on individual life histories and behaviour, population growth, community structure and change including the process of ecological succession.

SJZOL1C03.5	Describe the characteristics of the major biomes and ecosystems of the Earth in general and special emphasis on Biogeographical zones of India.
SJZOL1C03.6	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
SJZOL1C03.7	Understand Animal behavior and response of animals to different instincts
SJZOL1C03.8	Understand of cognitive/behavior neurobiology, thus allowing then to correlate the animal behavior under different situations including navigations and migration.
SJZOL1C03.9	Explain the behavior of animals, with particular emphasis on group living and parental care

SJZOL2C04 : PHYSIOLOGY

SJZOL2C04.1	Explain the process of digestion, absorption and different factors which regulate the process of digestion.
SJZOL2C04.2	Describe Process of urine formation in kidney and acid base balance.
SJZOL2C04.3	Understand the process of oxygen and carbon dioxide transport in body.
SJZOL2C04.4	Outline the basic control processes of the nervous systems and explain diseased states of the brain in detail.
SJZOL2C04.5	Associate and discuss the process of sensory perception.
SJZOL2C04.6	Illustrate the basic concept and interrelationship among blood pressure, blood flow and functioning of the heart.
SJZOL2C04.7	Explain the functions of lymph and lymphatic system.
SJZOL2C04.8	Understand the way different systems interact to yield integrated physiological responses to challenges such as exercise, fasting and ascent to high altitude, and how they can sometimes fail.

SJZOL2C05 : MOLECULAR BIOLOGY

SJZOL2C05.1	Explain concepts of DNA replication and repairing mechanisms.
SJZOL2C05.2	Describe the connection between DNA and RNA.
SJZOL2C05.3	Define codon and explain their role in Transcription.
SJZOL2C05.4	Differentiate the structure of prokaryotic and eukaryotic ribosomes as well as the translation process.
SJZOL2C05.5	Explain control of gene expression at transcription and translation level.
SJZOL2C05.6	Compare the structure and characteristics of eukaryotic, prokaryotic and organelle genome in detail.
SJZOL2C05.7	Understand the concept of Interrupted genes, Gene families and Transposons
SJZOL2C05.8	Illustrate the molecular mechanisms involved in recombination of DNA with special emphasize on Holliday model.

SJZOL2C06 : SYSTEMATICS AND EVOLUTION

SJZOL2C06.1	Explain the process, procedures, and purpose of the scientific classification of animals
SJZOL2C06.2	Differentiate various concepts of the species and theories of classification
SJZOL2C06.3	Distinguish different kinds of taxonomic characters and function of each in detail.

SJZOL2C06.4	Discuss the development and nature of the current system of zoological nomenclature
SJZOL2C06.5	Critically evaluates the ethics and impediments in taxonomic research.
SJZOL2C06.6	Validate the mechanism of natural selection and sexual selection using appropriate examples.
SJZOL2C06.7	Define and differentiate different mechanisms involved in the evolution.
SJZOL2C06.8	Differentiate many prevailing hypotheses of the origin of animal life on Earth
SJZOL2C06.9	Summarize the stages in primate evolution including Homo

SJZOL2L01 : BIOCHEMISTRY, BIOPHYSICS AND BIOSTATISTICS

SJZOL2L01.1	Understand Good laboratory practices in a chemistry/biochemistry laboratory.
SJZOL2L01.2	Apply the scientific method to the processes of experimentation and hypothesis testing.
SJZOL2L01.3	Construct skill and proficiency in preparation of laboratory reagents.
SJZOL2L01.4	Analyze the chromatographic techniques and apply the min isolating and characterizing different biological molecules.
SJZOL2L01.5	Differentiate the properties of carbohydrates, proteins, lipids, DNA and, RNA, their importance in biological systems.
SJZOL2L01.6	Understand the concepts of preparation of buffers
SJZOL2L01.7	Apply hypothesis testing via some of the statistical distributions.
SJZOL2L01.8	Calculate (with technology) and interpret summary statistics for a quantitive variable, including mean, median and standard deviation.

SJZOL2L02 : PHYSIOLOGY, MOLECULAR BIOLOGY AND CYTOGENETICS

SJZOL2L02.1	Correlate the physiological action of digestive enzymes at different conditions.
SJZOL2L02.2	Practice the medical laboratory techniques.
SJZOL2L02.3	Observe and identify the cell cycle stages and chromosomes
SJZOL2L02.4	Identify the karyotype of the given clinical condition.
SJZOL2L02.5	Estimate the levels of biomolecules; DNA, RNA and Protein in different samples
SJZOL2L02.6	Demonstrate the normal cardiac, respiratory, digestive physiology of different model organisms.

SJZOL2L03 : ECOLOGY, ETHOLOGY, SYSTEMATICS AND EVOLUTION

SJZOL2L03.1	Apply the practical knowledge in describes the differentiating properties of terrestrial, aquatic and marine ecosystem.
SJZOL2L03.10	Experimentally demonstrate and the opportunity to apply content knowledge and skills in a context outside the classroom
SJZOL2L03.2	Analyze the physico-chemical and biological parameters of water and soil.
SJZOL2L03.3	Illustrate the importance of cooperation and reconciliation in social groups
SJZOL2L03.4	Design methods of basic data collection and construct proper experimental design on cooperative behaviour of animals.
SJZOL2L03.5	Understand basic taxonomic procedures

SJZOL2L03.6	Construct and analyze different taxonomic key.
SJZOL2L03.7	Compare and interpret concepts of evolution
SJZOL2L03.8	Evaluate gene frequency based on Hardy – Weinberg equilibrium.
SJZOL2L03.9	Critically reflects the importance of the preservation and management of natural and seminatural habitats of conservation importance.

SJZOL3C07 : IMMUNOLOGY

SJZOL3C07.1	Describe which cell types and organs present in the immune response.
SJZOL3C07.2	Define antigen and describe how antigens affect the adaptive defenses
SJZOL3C07.3	Design a model of Immunoglobulins
SJZOL3C07.4	Describe immune cell Activation, maturation and the expression of their receptors.
SJZOL3C07.5	Discuss complement system and role of MHC in immune system
SJZOL3C07.6	Recall the success of various transplant procedures
SJZOL3C07.7	Exemplify the adverse effect of immune system including Allergy, hypersensitivity and autoimmunity
SJZOL3C07.8	Elucidate the reasons for immunization and aware of different vaccination

SJZOL3C08 : DEVELOPMENT BIOLOGY AND ENDOCRINOLOGY

SJZOL3C08.1	Define and explain the basic concepts of development with the help of suitable examples.
SJZOL3C08.10	Distinguish the male and female reproductive hormones and its mechanism of action in each sex.
SJZOL3C08.2	Discuss the process of gametogenesis and events during fertilization.
SJZOL3C08.3	Compare and contrast the process of organogenesis in the various model organisms discussed during this unit.
SJZOL3C08.4	Interpret the experiments that demonstrate the inductive functions of these tissues.
SJZOL3C08.5	Explain the principal cellular mechanisms of development and identify the genetic and molecular elements that are involved.
SJZOL3C08.6	Compare the process of metamorphosis, regeneration and ageing in different model organisms.
SJZOL3C08.7	Understand the environmental regulation and evolutionary changes of the animal development.
SJZOL3C08.8	Describe the synthesis, modes, regulation and mechanism of action of hormone.
SJZOL3C08.9	Identify pathophysiology of the glands, organs, tissues and cells that synthesize and secrete hormones, hormone precursors and associated compounds.

SJZOL3E09 : HUMAN GENETICS 1: CLINICAL GENETICS

SJZOL3E09.1	Distinguish Mendel's principles and its deviations in the inheritance of disease causing genes with the help of pedigree chart.
SJZOL3E09.2	Integrate the skills in human genetics with capability for karyotyping and nomenclature of metaphase chromosome bands.
SJZOL3E09.3	Adequately relates the factors involved in spontaneous abortions and its genetic background.
SJZOL3E09.4	Understand the chromosome anomalies and associated diseases.

SJZOL3E09.5	Mention the basics of biotechnology tools that can be used in clinical diagnosis and treatment.
SJZOL3E09.6	Introduction to gene manipulation methods in human, recombinant DNA technology; gene modifications, somatic and germ-line therapy.
SJZOL3E09.7	Explain the signal transduction pathways with special emphasize on the molecules that can be targeted for treatment of genetic disorders.
SJZOL3E09.8	Summarize the advancement in computerized biology information, introduction to genomics and proteomics databases.

SJZOL4C10 : BIOTECHNOLOGY AND MICROBIOLOGY

SJZOL4C10.1	Understand the steps involved in recombinant DNA technology
SJZOL4C10.2	Explain the construction of rDNA & c DNA library and their applications.
SJZOL4C10.3	Describe the types of PCR and applications in Biotechnology and genetic engineering
SJZOL4C10.4	Understand the steps of gene synthesis and applications of molecular markers.
SJZOL4C10.5	Discuss the applications of recombinant DNA technology in agriculture, production of therapeutic proteins, animal culture, media preparation and transgenic animals.
SJZOL4C10.6	Discuss IPR, ethical and social implications in the field of biotechnology.
SJZOL4C10.7	Classify and explain the structure and general characteristics of Microorganisms.
SJZOL4C10.8	Understand nutritional requirements, utilization of energy and growth of microbes.
SJZOL4C10.9	Discuss list of microbial diseases and various methods to control microbes
SJZOL4C10.10	Explain industrial and environmental application of microbiology

SJZOL4E11 : HUMAN GENETICS II: DIAGNOSTIC GENETICS

SJZOL4E11.1	Describe the genetics behind list of inborn errors of metabolism in humans.
SJZOL4E11.2	Understand the role of developmental genetics in defining biological processes
SJZOL4E11.3	Identify the opportunities of the technique “ART” in infertility clinics.
SJZOL4E11.4	Explain different molecular biology and biotechnology protocols as the diagnostic tools of genetic diseases.
SJZOL4E11.5	Critically evaluates the significance of different prenatal diagnosis techniques in the treatment of genetic disorders in its historical and future perspectives.

SJZOL4E12 : HUMAN GENETICS III: CANCER GENETICS AND GENETIC SERVICES

SJZOL4E12.1	Understand the genetic mechanisms of cancer development and progression
SJZOL4E12.2	Explain different types cancers and its genetic background
SJZOL4E12.3	Discuss the role of genomic instability in cancer progression.
SJZOL4E12.4	Critically evaluate the role of genetic counseling in genetic services.

SJZOL4E12.5	Explain molecular biology and biotechnology protocols, including PCR, gene isolation and cloning, gene mapping, and sequence analysis (basic bioinformatics) as part of genetic services and diagnosis.
SJZOL4E12.6	Identify the criterias to be followed and the substantiating challenges in the maintenance of medical ethics in genetic services.
SJZOL4E12.7	Understand the immune system related diseases and its treatments.
SJZOL4E12.8	Discuss the genetic effects of radiation and its clinical applications in the diagnosis and treatments.
SJZOL4E12.9	Test the reliability and usefulness of genetic services in a population based on the epidemiological and dermatoglyphic studies.

SJZOL4L04 : IMMUNOLOGY, DEVELOPMENTAL BIOLOGY, ENDOCRINOLOGY, BIOTECHNOLOGY, MICROBIOLOGY AND MICROTECHNIQUE

SJZOL4L04.1	Understand the structural and functional features of Organs of immune system.
SJZOL4L04.2	Prepare and analyze the serum sample and also the various components of blood.
SJZOL4L04.3	Compare the early developmental process of frog embryo upto gastrula stage.
SJZOL4L04.4	Acquire skills to analyze the different developmental stages of chick embryo upto 72 hours.
SJZOL4L04.5	Compare and differentiate various types of larval forms according to their special features.
SJZOL4L04.6	Enumerate the different types of placenta and its functions in mammals.
SJZOL4L04.7	Construct and analyze the electrophoretogram from genetic material of different sample.
SJZOL4L04.8	Practice different staining methodologies for microorganisms and categories them according to their features.
SJZOL4L04.9	Prepare and differentiate various types of tissues after corresponding staining procedures.

SJZOL4L05 : HUMAN GENETICS I & II

SJZOL4L05.1	Understand sterilization, medium preparation methods
SJZOL4L05.2	Design the cell culture protocol for the karyotyping of the human chromosomes from the blood samples
SJZOL4L05.3	Construct a karyotype and identify the genetic condition of the sample provided.
SJZOL4L05.4	Estimate the blood parameters using the spectrophotometer and evaluate the clinical significance of the samples provided
SJZOL4L05.5	Differentiate the fetal and adult hemoglobin from the sample provided
SJZOL4L05.6	Identify the organ system disease conditions from the analysis of the clinical conditions observed in the photograph or karyotype.
SJZOL4L05.7	Identify the human development stage based on the characteristics of the given specimen.
SJZOL4L05.8	Critically evaluate the ART and prenatal diagnostic tools applications in the clinical conditions.

SJZOL4L06 : HUMAN GENETICS III

SJZOL4L06.1	Construct the pedigree based on the available clinical information and provide the counselling as the genetic service to the condition.
SJZOL4L06.2	Understand the basics operational knowledge of diagnostic tools PCR, electrophoresis etc.
SJZOL4L06.3	Differentiate the dermatoglyphic patterns in different individuals using ink and print method.
SJZOL4L06.4	Estimate the gene and allele frequency of the population based on the analysis of the available data provided.
SJZOL4L06.5	Test the blood group based on cross matching method and identify the blood group of the sample provided.

SJZOL4P07 : PROJECT WORK

SJZOL4P07.1	Understand that detail planning is necessary for the successful and safe experimentation
SJZOL4P07.2	Convert scientific questions into hypothesis that can be tested experimentally
SJZOL4P07.3	Prepare and present recorded results accurately and in an understandable form
SJZOL4P07.4	Identity the general characteristics of experiments that will yield valid scientific conclusion
SJZOL4P07.5	Design appropriate experiments to test hypothesis and evaluate the strength and weakness of experiments and their design
SJZOL4P07.6	Reach conclusions that are supported by the experimental results.

SJZOL4V08 : VIVA VOCE

SJZOL4V08.1	Prepare comprehensively to answer questions from all the courses of four semesters.
SJZOL4V08.2	Attain Oral Presentation skills by answering questions in precise and concise manner.
SJZOL4V08.3	Gain confidence and inter-personal skills