DEPARTMENT OF ZOOLOGY

PROGRAMME SPECIFIC OUTCOME

On the successful completion of **B.Sc. Zoology** programme, students will

PSO1:	Understand the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevance in the day-to-day life.
PSO2:	Able to identify a range of invertebrate and vertebrate animals.
PSO3:	Acquire Information from core subjects in the biological sciences, including cell biology, developmental biology, genetics, ecology, Biotechnology, and evolution.
PSO4:	Gain knowledge of animals and their interactions with the environment.
PSO5:	Develop skills in basic laboratory Techniques.
PSO6:	Obtain Employability particularly for a career in Zoology and for relevant post-graduate study.

On the successful completion of **M.Sc. Zoology** programme, students will

PSO1:	Develop working knowledge of facts and concepts in a specific area of biology.
PSO2:	Understand and create awareness of relevant theories, paradigms, concepts and principles of zoology.
PSO3:	Able to express the scientific method through the use of hypothesis testing in the design and implementation of an experiment.
PSO4:	Comprehend the evolutionary history and main characteristics and physiological functions of main animal groups.
PSO5:	Understand the relationships between elements of animal biodiversity and the physical, biological, and cultural environment.
PSO6:	Get knowledge of Wide range of solutions that animals have evolved to deal with their environment.
PSO7:	Undertake a quantitative and qualitative approach to acquiring, analyzing and interpreting data.

On the successful completion of **M. Phil Zoology** programme, students will

PSO1:	Acquire in-depth knowledge of scientific phenomenon related to various subjects in Zoology.
PSO2:	Obtain the skills in handling scientific instruments, planning and performing in laboratory experiments.
PSO3:	Develop the skills of observations and drawing logical inferences from the scientific experiments.
PSO4:	Analyze the given scientific data critically and systematically and the ability to draw the objective conclusions.
PSO5:	Able to effectively use statistical and analytical methods.
PSO6:	Extend technical competence in planning, conducting and reporting on investigations.

COURSE OUTCOMES

SEMESTER: I

Subject Name: INVERTEBRATA **Subject Code: U2ZYC1**

In this course, the students will

CO1:	Understand the systemic position and classification principles of various group of animals, impart knowledge about general characteristics of various Phyla belongs to invertebrata.
CO2:	Acquire knowledge about single cell animals and sponges, understand the structure, reproduction and life cycle of obelia.
CO3:	Realize the coral reef role in the marine environment. Buildup the familiarity among the students regarding earthworm morphology and anatomical system.
CO4:	Gain Information about Structure of Pila and know about Cephalopods as an advance Mollusca.

SEMESTER: II

Subject Name: CHORDATA **Subject Code: U2ZYC2**

In this course, the students will

CO1:	Inculcate the general characters and classification of various classes of animals in Chordata.
CO2:	Familiarise the retrogressive metamorphosis in ascidian and affinities of Balanoglossus.
CO3:	Comprehend the classification of fishesupto order level with reference to Shark. Develop idea about Terrestrialization of Amphibians.
CO4:	Identify the classification of reptiles with reference to poisonous and non-poisonous snakes.
CO5:	Study the origin, dominance and decline of dinosaurs.
CO6:	Become Conversant with the classification of Aves up to super orders, migration in birds and affinities of Archaeopteryx.
CO7:	Gain Knowledge about adaptation of aquatic mammals.

SEMESTER: III

Subject Name: CELL BIOLOGY **Subject Code: U2ZYC3**

In this course, the students will

CO1:	Understand how to see the live specimens as well as preserved slide through the Microscopy and that knowledge are useful for their higher studies.
CO2:	Know how to the preserve the rare specimens of plant and animals through the Cytological Techniques and compare the normal cell vs infected cell or cancer cell etc.
CO3:	Understand the role and importance of cells in our system.
CO4:	Understand the hereditary character from their ancestor through the DNA – Chromosomes followed the next study of Mitosis and Meiosis- no organism in this world.
CO5:	Know their biological system through the Protein Synthesis mechanism and know the impact of Cancer cell and their role and treatment.

SEMESTER – IV

Subject Name: DEVELOPMENTAL BIOLOGY **Subject Code: U2ZYC4**

In this course, the students will

CO1:	Study the vertebrate developmental stages through the embryonic development from egg to adult.
CO2:	Know about the anatomy of testis through the spermatogenesis process, types of egg and fertilization followed by without mating the young one are produced through the parthenogenesis etc.
CO3:	Understand the developmental stages from the fertilized egg to Cleavage, Blastula, and Gastrula.
CO4:	Illustrate the fate map which is very useful to see the developmental stages of the organism using certain stain and movement of germinal layers.
CO5:	Know the early developmental stages of frog from egg to adult, followed by regeneration of salamander limbs through the experimental evidences.
CO6:	Study the different types of vertebrate placentation study in mammals and how to reduce the population rate through the contraceptive devices and test tube baby for inability human to get the young ones.

SEMESTER: V

Subject Name: ANIMAL PHYSIOLOGY **Subject Code: U2ZYC51**

In this course, the students will

CO1:	Understand the basic nutritional requirements of human body.
CO2:	Compare and contrast the feeding mechanism and digestive process in different organisms.
CO3:	Distinguish the structure and functions of various organs of different animal groups.
CO4:	Demonstrate competence in identifying human blood groups, and differentiation and enumeration of human blood cells.
CO5:	Outline the structure of muscle and nerve, and classify the sensory receptors.
CO6:	Explain the steps involved in the formation of waste materials in various organisms.
CO7:	Analyze the coordinated functioning of hormones in human body.

Subject Name: GENETICS **Subject Code: U2ZYC52**

In this course, the students will

CO1:	Acquire knowledge of the laws of inheritance and their relevance in the inheritance of observable traits.
CO2:	Explain the basic principles of genetics and to recognize the important role that genetics can play in many aspects of our lives.
CO3:	Understand the mechanism of sex determination in different organisms and chromosomal abnormalities.
CO4:	Acquire the skills to determine the blood group of individuals.
CO5:	Identify genetic disorders caused by homozygous recessive alleles in a family by analyzing the pedigree chart and predict the predisposition of a genetic disease.
CO6:	Infer the functions of genetics elements, which cover replication, transcription, RNA processing and translation.

Subject Name: MICROBIOLOGY AND IMMUNOLOGY

Subject Code: U2ZYC53

In this course, the students will

CO1:	Know the Subdivision of microorganisms into different groups such as protozoa, fungi, bacteria and virus.
CO2:	Describe the structure of a prokaryotic cell and differentiate it from a eukaryotic cell. Prepare culture media for bacterial and fungal growth.
CO3:	Understand the role of microbes in food spoilage and contamination.
CO4:	Analyze the bacterial population in different samples.
CO5:	Associate the microorganisms into infections in human beings and devise treatment strategies for certain diseases.
CO6:	Identify the structure of various lymphoid organs and label their parts.
CO7:	Prepare antigen and serum from sheep blood.
CO8:	Develop skills to isolate lymphocytes in human blood.
CO9:	Demonstrate the principle of vaccination against infectious diseases.
CO10:	Understand the causes and symptoms of immunological diseases.

SEMESTER VI

Subject Name: ECOLOGY **Subject Code: U2ZYC61**

In this course, the students will

CO1:	Realize the importance of interrelationship between organisms and environment.
CO2:	Explain the concept of ecosystem related to biotic and abiotic factors and various biogeochemical cycles.
CO3:	Understand the habitat ecology aspects with physical features, fauna and their adaptions of freshwater, marine and terrestrial ecosystem.
CO4:	Know about the population growth forms, intra-specific and inter-specific population interactions topics covered for understanding the knowledge of Commensalism, mutualism between populations.
CO5:	Review the causes, effects and control measures of air, water, noise, radioactive pollution and solid waste management.
CO6:	Have a clear cut understanding of principles of conservation, endangered species and social forestry.
CO7:	Be aware of climate change, levels of biodiversity impact of deforestation and the necessity conservation of forest.

Subject Name: BIO- CHEMISTRY **Subject Code: U2ZYC62**

In this course, the students will

CO1:	Learn the diversity of Biological molecules and chemical bonds involved in Biological systems.
CO2:	Demonstrate the principles and application of Bio-Chemical techniques viz., pH meter, electrophoresis, centrifugation and chromatography.
CO3:	Be familiar with the structure, classification and biological importance of primary energy producer Carbohydrates.
CO4:	Learn the biological importance and classification of amino-acids, proteins and fatty acids.
CO5:	Understand the classification, mechanism, types of enzymes and Expand chemistry of hormones and their functions.

Subject Name: EVOLUTION **Subject Code: U2ZYC63**

In this course, the students will

CO1:	Understand the evolutionary process for human life.
CO2:	Study the origin of life which gives knowledge about Abiogenegesis and biogenesis theory.
CO3:	Know about various theories of evolution like Lamarckim, Darwinism, Sexual selection theory, Artificial selection theory, Modern synthetic theory postulated by various evolutionists.
CO4:	Understand the concept of Mimicry and their significance and micro and macro evolution.
CO5:	Knowledge about population evolution and speciation topics about the formation of new species.
CO6:	Illustrate palaeontology studies like fossils and methods of dating fossil for getting additional knowledge about future evolution.

I M.Sc Zoology

Subject Name: ECONOMIC ZOOLOGY **Subject Code: P2ZYN2**

In this course, the students will

CO1:	**S**elf-employment is inevitable in these days and this paper concentrates on this very clearly Here.
CO2:	In all aspects of the above.
CO3:	Silkworm rearing.

Subject Name: CELL AND MOLECULAR BIOLOGY **Subject Code: P2ZYC11**

In this course, the students will

CO1:	Learn the central dogma of molecular biology and study the ultra structure of cells in detail and understand the functions and importance of organs.
CO2:	Know about the primary function of cell membrane that is the movement of particles into and out of the cells.
CO3:	Learn about the chromosomes with their normal and unusual conditions and functions.
CO4:	Understand the cell cycle and the regulation of cell cycle.
CO5:	Acquire knowledge of the causative agents of cancer and the diagnosis of its markers.
CO6:	Know about the oncogenes and the environmental carcinogens.

Subject Name: BIOCHEMISTRY **Subject Code: P2ZYC12**

In this course, the students will

CO1:	Study about Water and electrolyte dissociation.
CO2:	Learn about the relation between insulin and diabetic disorder.
CO3:	Learn about DNA.

Subject Name: BIOPHYSICS **Subject Code: P2ZYC13**

In this course, the students will

CO1:	Gain knowledge about structure of atom, electronic configuration, valency, chemical bonds, hydrophobic and hydrophilic interactions, and DNA-protein interactions.
CO2:	Understand thermodynamics, enthalpy, entropy free energy concepts, energy metabolism and high energy compounds.
CO3:	Transport mechanisms across the membrane and their kinetics and the role of sodium-potassium pump in our physiology and its impact on diseases.
CO4:	Know about Electromagnetic spectrum, bioluminescence and photosynthesis.

Subject Name: TECHNIQUES IN BIOLOGY **Subject Code: P2ZYE1**

In this course, the students will

CO1:	Prepare the students for CSIR exams.
CO2:	Understand principles of microscopy, chromatography including HPLC, ultracentrifugation, and other related techniques.
CO3:	Learn about PCR principles and types and their applications in various fields.
CO4:	Study about NA hybridization, denaturation, renaturation, cot curvers, sequencing of proteins and nucleic acids and other biotechnological techniques.
CO5:	Know about Spectroscopy X-ray diffraction, visible, NMR, ESR, AAS and other related techniques.
CO6:	Understand the Principles and applications of isotopes, measurement of radioactivity, GM counter, scintillation counter and autoradiography.

Subject Name: MOLECULAR GENETICS **Subject Code: P2ZYC21**

In this course, the students will

CO1:	Understand the factors determining heredity and to learn the physical and chemical properties of nucleic acids such as DNA, RNA and their synthesis.
CO2:	Know about the types and causes of chromosomal abnormalities and their effects.
CO3:	Understand the gene regulation in prokaryotes and eukaryotes.
CO4:	Learn about Transcription in prokaryotes and eukaryotes which added to improve the information about the data presentation.

Subject Name: ECOLOGY **Subject Code: P2ZYC22**

In this course, the students will

CO1:	Learn the Structure of ecosystem, classification, energy, concepts of productivity, food chain and food web.
CO2:	Learn about Biogeochemical cycles like Population dynamics, growth form, population fluctuations.
CO3:	Study about Population in communities and the evolution of biosphere.
CO4:	Learn about Renewable and non-renewable resources.
CO5:	Acquire Knowledge about Cryopreservation of sperms and embryos, pollution of air, water and soil with their control measures.
CO6:	Learn about Nature of food additives.

Subject Name: BIOSTATISTICS, COMPUTER APPLICATIONS AND BIOINFORMATICS **SUBJECT CODE: P2ZYC23**

In this course, the students will

CO1:	Understand the statistical methods.
CO2:	Know how to Present data in the form of graphs and other methods.
CO3:	Learn Experimental design.
CO4:	Learn about Hardware components of computer.
CO5:	Know Software types and programming languages and Word processing.

II M.Sc ZOOLOGY

Subject Name: IMMUNOLOGY **Subject Code: P2ZYC31**

In this course, the students will

CO1:	Understand the importance of their immune system.
CO2:	Study the cells and organs of the system for the better understanding of our immune cell functioning and responses.
CO3:	Learn about the transplantation immunology which is very important and more applicable.
CO4:	Learn about ELISA, Western Blotting, etc. and agglutination and precipitation reactions, related to the diagnosis of diseases.

Subject Name: MICROBIOLGY **Subject Code: P2ZYC32**

In this course, the students will

CO1:	Know the role of normal and pathogenic microbial flora in their system.
CO2:	Know about the impact of microbes in air, water and soil and the role of microbes in causing life-threatening diseases.
CO3:	Be able to understand the preventive measures for the etiologic agents and vaccination procedures.

Subject Name: EVOLUTION **Subject Code: P2ZYC33**

In this course, the students will

CO1:	Understand the main role of gene rearrangement and allele frequencies.
CO2:	Know about Darwin's Natural Selection Theory.
CO3:	Learn about all types of evolutionary processes with the background of genetics and exact genes.

Subject Name: SERICULTURE **Subject Code: P2ZYE3**

In this course, the students will

CO1:	Know about the production of silk.
CO2:	Learn about the cultivation of mulberry leaves which is the main food source of silkworms.
CO3:	Learn about the silk rearing process and The advanced methods for silk rearing and prevention of silkworm diseases.
CO4:	Operating mechanism in rearing.

Subject Name: DEVELOPMENTAL BIOLOGY **Subject Code: P2ZYC41**

In this course, the students will

CO1:	Know the basic of our organs and their functions and the development of each and every organ in the embryonic level.
CO2:	Know the process of fertilization in detail and the main impact of pluripotent stem cells which explain the development of all cells including granulocytes and agranulocytes.
CO3:	Understand embryonic development of yolk sac, chorion, amnion and allantois and development of extra embryonic membrane of chicks.
CO4:	Have profound knowledge about the comparison of embryonic development between humans and other species.

Subject Name: ANIMAL PHYSIOLOGY **Subject Code: P2ZYC42**

In this course, the students will

CO1:	Understand the physiology of our organ and tissue system.
CO2:	Acquire knowledge about All the systems including nutrition, digestion, circulation, respiration, osmoregulation, excretion, nervous system, skeletal system.
CO3:	Understand the malfunctioning of these systems and also the complications and the preventive measures and control measures.
CO4:	Know about Human reproduction with the background of physiology and energy storage.

Subject Name: BIOTECHNOLOGY **Subject Code: P2ZYC43**

In this course, the students will

CO1:	Now, we all know very clearly that every character is coded by a gene and it is inheritable.
CO2:	Know the history of the discovery of how every character is coded by a gene with evidence.
CO3:	Understand the impact of normal microbial flora, especially, *Escherichia coli*, as a cloning vector.
CO4:	Know about All health care products including vaccines which are produced by recombination process.
CO5:	Have knowledge about DNA vaccines.

Subject Name: AQUACULTURE **Subject Code: P2ZYE4**

In this course, the students will

CO1:	Gain knowledge about the cultivation of fishes and construction of fish ponds.
CO2:	Know about the maintenance of fish culture and fish hachuring and about ornamental fishes as they change the appearance of the residence and auspicious.
CO3:	Learn the methods to market the fishes.
CO4:	Learn the methods of fish preservation methods.

M. PHIL

Subject Name: RESEARCH METHODOLOGY **Subject Code: M1ZYC11**

In this course, the students will

CO1:	Be equipped with the thorough theoretical knowledge of instruments.
CO2:	Get the basic knowledge of do's and don't about the laboratory usage.
CO3:	Acquire the basic principles and better handling of the equipments and instruments in right manner.
CO4:	Be able to select the precise instrument or technology for the appropriate experiments.
CO5:	Understand the practical application of methods and the instruments for their respective research projects.
CO6:	Acquire and accept the ethical values of the research experimental animals for the research work.
CO7:	Learn about the Accountability of the research animals.
CO8:	Understand the rules of the ethical committee with relation to the research and animal accountability.
CO9:	Be well trained in operating any type of instruments in cautious manner after the completion of M.Phil course.
CO10:	Have the knowledge of thesis writing and paper publication.
CO11:	Have a thorough foundation in Research Methodology.

Subject Name: MODERN BIOTECHNOLOGY **Subject Code: M1ZYC12**

In this course, the students will

CO1:	Learn the basic tools in genetic engineering for making recombinant pharmaceutical products for the welfare of human beings.
CO2:	Acquire knowledge on the basic concepts of gene cloning in bacteria, plants and animals for developing genetically modified organisms, GMO, GM food and disease resistant plants.
CO3:	Understand the modern concepts of stem cell research for the applications of skin replacement, brain cell transplantation and xenotransplantation.
CO4:	Apply rDNA technology to create enzymes, vaccines, value added commodities, monoclonal antibodies for medical, industrial, pharmaceutical, agricultural, marine and aquatic processes that lower the risks associated with illness.

Subject Name: INDEPTH STUDY **Subject Code:M2ZYE11/12/13/14/15/16**

In this course, the students will

CO1:	Understand the research area pertaining to their research work.
CO2:	Be able to construct a research problem, fix the objective, experiment and methodology.
CO3:	Understand accurate explanation of the research topic.
CO4:	Specialize in a particular research area.
CO5:	Gain knowledge about the collection of reprints and research article.
CO6:	Acquire the Transfer of knowledge of methodology and instrument usage from the reprint paper for the experimental purpose to solve the research problem.
CO7:	Select the appropriate technique to his research objectives.
CO8:	Be able to collect the Back references from the related research papers.
CO9:	Gain basic knowledge of laboratory techniques related to the research area.
CO10:	Become well versed with the research techniques.
CO11:	Be able to collect the apt reprints matched with the research work.