AQAR – QUALITATIVE METRIC

2023 - 2024

Criterion 1 - Curricular Aspects

1.1.1 Curricula developed and implemented have relevance to the local, national, regional and global developmental needs which is reflected in Programme outcomes (POs), Programme specific outcomes (PSOs) and Course Outcomes (COs), of the Programmes offered by the Institution.

Name of the Programme: M.Sc ZOOLOGY **Programme Code: PSZO**

Programme Outcomes:

PO 1	Apply Acquired knowledge to solve major and complex issues in the society/industry.
PO 2	Attain research skills to solve complex Cultural, Societal and Environment issues.
PO 3	Employ latest and updated tools and technologies to solve complex issues.
PO 4	Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.
PO 5	Develop the scientific temperament to carry out research project with professional ethics.

Programme Specific Outcomes:

PSO 1	Gain comprehensive knowledge in different branches of zoology – Cell & Molecular Biology, Biochemistry, Microbiology, Developmental Biology, Immunology, Genetics, Biotechnology, Bioinformatics and Evolution.
PSO2	Interrelate the concepts of gene, genome, cell, tissue, organ and organ-system in the physiological adaptations, development, reproduction, behaviour of microbes, plants and animals
PSO 3	Perform experiments in the field of Microbiology, Biochemistry, Cell & Molecular Biology, Environmental Biology, Developmental Biology, Biostatistics, Immunology, Genetics, Biotechnology and Bioinformatics.
PSO 4	Develop empathy towards conservation of plants and animals and appreciate the diversity of animals and their inclusiveness in the sustenance of an ecosystem.
PSO 5	Express ideas and concept through oral presentation and organize research data in the form of dissertation writing.
PSO 6	Solve the environmental, social and ethical problems by applying the biological principles for minimizing pollutants by waste water treatment and solid waste management for eco-sustainable development.

PSO 7	Address the local, regional, national and global environmental issues and mitigating the same through Intervention strategies adopting standard protocol.
PSO 8	Practice judicious way of using animals in experiments, proper disposal of hazardous biological waste and ethics related to conserving endangered animals and plants.
PSO 9	Exhibit the holistic growth by developing interpersonal skills, subject proficiency, and to seek employability in clinical laboratory, Research institutions, Medical coding and IT companies.
PSO 10	Make them self employed/ Entrepreneur in the field of Sericulture, Fisheries and Aquaculture, Dairy farming, Apiculture and Poultry.
PSO 11	Use of computers for Power point presentation, Virtual Dissection, analysis of bio-molecules using bioinformatics software and computing biological data.
PSO12	Healthy diet pattern for combat life style disorder.

Course Outcomes:

Course Code	Course Title	Nature of the Course (Local/National/ Regional/Global)	Course Description	Course Outcomes
23PG1Z1	Structure and Function of Invertebrates	Local, National, Regional & Global	This course provides an overview of the Invertebrate and Vertebrate animals by focussing on the General characters, Classification, Special features and Biology of some selected Invertebrates.	CO 1 Remember the general concepts and major groups in animal classification, origin, structure, functions and distribution of life in all its forms. CO 2 Understand the evolutionary process. All are linked in a sequence of life patterns. CO 3 Apply this for pre-professional work in agriculture and conservation of life forms. CO 4 Analyze what lies beyond our present knowledge of life process. CO 5 Evaluate and to create the perfect phylogenetic relationship in classification.

23PG1Z2	Comparative Anatomy of Vertebrates	Local, National, Regional & Global	This course familiarizes the invertebrate phyla, and their anatomy. It also provides special attention to lower invertebrates of economic and medical importance to the human environment.	CO 1 Remember the general concepts and major groups in animal classification, origin, structure, functions and distribution of life in all its forms. CO 2 Understand the evolutionary process. All are linked in a sequence of life patterns. CO 3 Apply this for pre-professional work in agriculture and conservation of life forms. CO 4 Analyze what lies beyond our present knowledge of life process. CO 5 Evaluate and to create the perfect phylogenetic relationship in classification.

23PG1Z3	Lab Course in Invertebrates & Vertebrates	Local, National, Regional & Global	This course will give a thorough investigation of Invertebrates and Chordates, looking at the anatomy and contrasting the characteristics.	CO 1 Understand the structure and functions of various systems in animals CO 2 Learn the adaptive features of different groups of animals CO 3 Learn the mounting techniques CO 4 Acquire strong knowledge on the animal skeletal system CO 5 Learn the salient features and their modes of life

23PG1ZE1 (Elective 1)	Molecules and their interaction relevant to Biology	Global & National	The course is designed to provide firm foundation in the principles of Biochemistry by providing knowledge on structure, biochemical properties of biomolecules and the role of these biomolecules in the major metabolic pathways of a living system.	CO 1 Analyse the Structure of atoms, molecules and chemical bonds CO 2 Recall the structure, properties and metabolism of biomolecules. CO 3 Assess the mechanism of enzyme action. CO 4 Identify the thestructural conformation of proteins and nucleic acids CO 5 Describe the stabilization of interactions in biomolecules

23PG1ZE2	Fisheries & Aquaculture	Local, National, Regional & Global	This Course focuses on Fisheries and Aquaculture of Finfishes, Marine Prawn, Pearl Oyster and Disease Management.	CO 1 Identify the economically important fishes and fishery products. CO 2 Plans according to the recent concepts in fisheries management. CO 3 Distinguish the various aquaculture systems. CO 4 Organizes the type of hatchery, brood stock, larval production, feed management water quality and disease management in cultivable species, live feed production. CO 5 Evaluates the Fisheries and Aquaculture Practices in India.

23PG1ZE3 (Elective 2)	Biostatistics	Global& National	This course deals with specific procedures or techniques used to identify and process the research data.	CO 1 Clear understanding of design and application of biostatistics relevant to experimental and population studies. CO 2 Organise the research data in appropriate order and apply the measures of central tendency and dispersion values. CO 3 Acquired skills to perform various statistical analyses using modern statistical techniques and software. CO 4 Compute degrees of relationship variables using Correlation and Regression analysis CO 5 Knowledge on the merits and limitation of practical problems in biological/ health management study as well as to propose and implement appropriate statistical design/ methods of analysis.

23PG1ZE4	Environmental Toxicology	Local, National, Regional & Global	The goal of this course is to introduce the student to the field of Environmental Toxicology where the basic principles of toxicology are applied to environmental problems.	CO 1 Summarize the scope, importance, types and dose – response relationship of environmental toxicants. CO 2 Explain the transport and fate of toxicants in the environment. CO 3 Organize the events in the translocation of toxicants. CO 4 Analyse the nature of toxicity at organism, Organ and environmental level. CO 5 Assess the various methods of testing environmental toxicants

23PG1ZSE SEC - EDC	Sericulture	Local, National, Regional and Global	This course provides the knowledge of rearing of silkworm to produce raw silk.	CO 1 Summarize the history, scope, source, types, importance and advantage of silk fibre in India. CO 2 Explain the distribution, morphology, cultivation techniques and disease of Mulberry plant. CO 3 Analyse the morphology, anatomy, life cycle of Bombyx mori CO 4 Explain the methods of rearing process. CO 5 Identify and explain the Cocoon harvesting and marketing.

23PG2Z4	Cell and Molecular Biology	Global& National	This course deals with the central dogma of molecular biology and to understand the basis of heredity.	CO 1 Understand the general concepts of cell and molecular biology. CO 2 Understand the general concepts of cell and molecular biology. cellular structures influencing functional features. CO 3 Perceive the importance of physical and chemical signals at the molecular level resulting in modulation of response of cellular responses. CO 4 Updated the knowledge on the rapid advances in cell and molecular biology for a better understanding of onset of various diseases including cancer. CO 5 Understand the general concepts of cell and molecular biology.

23PG2Z5	Developmental Biology	Global& National	This Course focuses on the developmental process from a single egg to zygote by fertilization, into blastula by Cleavage, followed by Gastrulation in to Gastrula. From Gastrula, organ forming rudiments are formed, which give rise to the Organ Systems of the Organism.	CO 1 Define the concepts of embryonic development CO 2 Observe various stages of cell divisions under microscope CO 3 Understand the formation of zygote CO 4 Differentiate the blastula and gastrula stages CO 5 Learn the distinguishing features of three different germ layers and formation of various tissues and organs

23PG2Z6	Lab Course in Cell Biology and Developmental Biology	Local, National, Regional & Global	It includes cell biology experiments such as observation of mitotic stages in onion root tip and visualizing giant chromosome in *Chironomus* larva and isolation and estimation of DNA and RNA.	CO 1 Identify various stages in mitosis and meiosis. CO 2 Detection of polytene chromosome in salivary gland cells of the larvae of the Chironomus CO 3 Organize the steps in isolation of genomic DNA and RNA CO 4 Analyse the steps and principles involved in Agarose gel electrophoresis and SDS-Polyacrylamide gel electrophoresis techniques. CO 5 Analyse the various developmental stages in Chick embryo

23PG2ZE5 (Elective 3)	Economic Entomology	Local, National, Regional & Global	This course deals with the study of insects including systematic, beneficial insects, destructive insects, integrated pest management and insects of medical and veterinary importance.	CO 1 Understand taxonomy, classification and life of insects in the animal kingdom. CO 2 Know the life cycle, rearing and management of diseases of beneficial insects. CO 3 Know the type of harmful insects, life cycle, damage potential and management of pests including natural pest control CO 4 Recognize insects which act as vectors causing diseases in animals and human. CO 5 Overall understanding on the importance of insects in human life.

23PG2ZE6	Microbiology	Global & National	To understand the fundamentals of Microbial diversity and applications of microbes in Industry and Environment	CO 1 Describe the scope of microbiology, taxonomical classification, principle and components of different types of microscopes CO 2 Classify bacteria based on morphology, biochemical characteristics and growth parameters CO 3 Discuss the morphology and classification of viruses. CO 4 Explain the metabolism of bacteria CO 5 Appraise the role of bacteria in food, industry, medicine, environment and agricultural microbiology

23PG2ZE7	Research Methodology	Global& National	This course imparts the basic principle, methodology and applications of widely used instruments in biological sciences.	CO 1To understand the implications of GLP CO 2To learn the working principles of different instruments CO 3To gain the knowledge on techniques of histology and histochemistry CO 4To acquire knowledge on the basic principle and application of various modules of light and electron microscopy CO 5To analyse the applications of tracer teachniques and animal cell culture techniques

23PG2ZE8	Biophysics	Global& National	Biophysics which is an inter disciplinary course, deals with the discipline concerned with the application of the principles and methods of physics and the other physical sciences to the solution of biological problems.	CO 1 Classify the chemical bonds and forces interacting between molecules and Determine the theories involved in acidity and basicity CO 2 Apply the principles of Thermodynamics and biological oxidation in living organisms CO 3 Determine the principle, procedure, components involved and biological applications of Instruments CO 4 Analyse the principle, properties, instrumentation and biological applications of Electromagnetic radiation CO 5 Assess the principles of Photobiology in the Biophysical aspects of Vision and neurophysiology applied to the Animals

23PG2ZSE (SEC-EDC)	Poultry Farming	Local, National, Regional & Global	The course has great potential for creating self-employment and business opportunity	CO 1To understand the various practices in Poultry farming. To know the needs for Poultry farming and the status of India in global market. CO 2To be able to apply the techniques and practices needed or Poultry farming. CO 3To know the difficulties in Poultry farming and be able to propose plans against it. CO 4To understand the various practices in Poultry farming. To know the needs for Poultry farming and the status of India in global market. CO 5To be able to apply the techniques and practices needed or Poultry farming.
Off Class	SPSS	Global & National	It provides hands on experience on the tools and techniques of SPSS statistical package.	CO 1Apply the knowledge of research to frame the questionnaire based on hypothesis CO 2Organize the data in the

				form of Chart and diagrams using SPSS CO 3Analyze the data using descriptive statistics, T test, correlation and regression CO 4Demonstrate ANOVA and Hierarchical Clustering using SPSS software CO 5Interpret the results obtained through SPSS analysis tools
19PG3Z11	Biophysics	Global& National	Biophysics which is an inter disciplinary course, deals with the discipline concerned with the application of the principles and methods of physics and the other physical sciences to the solution of biological problems.	CO 1 Classify the chemical bonds and forces interacting between molecules and Determine the theories involved in acidity and basicity CO 2 Apply the principles of Thermodynamics and biological oxidation in living organisms CO 3 Determine the principle, procedure, components involved and biological applications of

				Instruments CO 4 Analyse the principle, properties, instrumentation and biological applications of Electromagnetic radiation CO 5 Assess the principles of Photobiology in the Biophysical aspects of Vision and neurophysiologyapplied to the Animals
19PG3Z12	Immunology	Global& National	The course intends to provide the biology of immune system and mechanism of immune response, maturation of lymphocytes and major histocompatibility complex and immune system related disorders and vaccines.	CO 1 Summarize the overview of the immune system CO 2 Elaborate the structure and properties of antigen and antibody and its interactions. CO 3 Determine the concept of MHC molecules and maturation and activation of lymphocyte. CO 4 Analyze the complement system and the types of hypersensitivity reactions. CO 5 Prioritize the types of

				vaccines and immunity in health and disease.
19 PG3Z13	Biostatistics & Research Methodology	Global& National	This course deals with specific procedures or techniques used to identify and process the research data.	CO 1 Organise the research data in appropriate order and apply the measures of central tendency and dispersion values. CO 2 Assess the difference between the expected and observed frequencies by Chi-Square test for testing of hypothesis CO 3 Compute degrees of relationship variables using Correlation and Regression analysis. CO 4 Examine the Concepts of Research and devise the Research Hypothesis CO5 Paraphrase the research work through documentation as a Thesis, Oral or Poster Presentation.

19PG3ZE1	Fisheries &Aquaculture	Local, National, Regional & Global	This Course focuses on Fisheries and Aquaculture of Finfishes, Marine Prawn, Pearl Oyster and Disease Management.	CO 1 Identify the economically important fishes and fishery products. CO 2 Plans according to the recent concepts in fisheries management. CO 3 Distinguish the various aquaculture systems. CO 4 Organizes the type of hatchery, brood stock, larval production, feed management water quality and disease management in cultivable species, live feed production. CO 5 Evaluates the Fisheries and Aquaculture Practices in India.
19PG3ZE2	Bioinformatics	Global& National	The course provides an outline on various DNA sequencing methods, and principle and methods of sequence analysis with various bioinformatics tools	CO 1 Summarize the Human Genome Project, shotgun sequencing, web browsers and search engines and flat file of biological databases. CO 2 Explain DOTPLOT , dynamic programming using

			and macromolecular structure prediction.	Needleman-Wunsch Algorithm and development in significance of substitution matrices CO 3 Make use of different PAM and BLOSUM for closely and distantly related sequences, Multiple sequence alignment CO 4 Examine Model Phylogenetic tree based on the distance matrix CO 5 Determine the secondary structure and three-dimensional structure prediction methods
19PG3Z14	Lab in Biophysics & Biostatistics	Local, National, Regional & Global	The course is designed to give a hand on experience in Biophysics and biostatistics	CO 1 Recall the principle of centrifuge, pH meter, Chromatography CO 2 Determine the maximum absorption and its molar extinction coefficient of sample CO 3 Estimate the pH Titration curve, Surface tension and viscosity of sample CO 4 Interpret the results for statistical analysis including

				mean, median, mode and Standard deviation for individual, continuous series CO 5 Determine the correlation, regression and significance for the statistical data
19PG3 Z15	Lab in Immunology, Fisheries &Aquacultureand Bioinformatics	Local, National, Regional & Global	It focuses on techniques related to the field of immunology. It includes preparation of antigens and to visualize precipitin and agglutination	CO 1Explain the different lymphoid organs,properties of soluble and particulate antigen CO 2Estimate the lymphocytes from peripheral blood and explain the biological databases NCBI CO 3Construct various bleeding techniques and separation of serum and plasma and plan a visit to aquarium. CO 4 Examine the experiment with complement mediated lysis, Immunoelectrophoresis and rocket immunoelectrophoresis identification and single /

				double immunodiffusion CO 5 Analyze the sequences BLAST AND ClustalO and Assess the formation of perciptin line and button formation
19PG4Z16	Environmental Biology	Local, National, Regional & Global	To understand the basic concepts of Ecology.	CO 1Develop an understanding of ecological key interactions and processes CO 2 Explain the factors involved in determining population size, Density, Distribution &Community function CO 3 Analyze sustainable utilization of natural resources CO 4 Agree significance of Biodiversity, consequences on loss of Biodiversity& conservation Strategies CO 5 Criticize various kinds of pollution in the environment, their impact on the ecosystem &

				impact of climatic change
19PG4Z17	Biotechnology	Global& National	This course provides knowledge about genetic engineering and rDNA technology and its application in gene therapy, cell culture and GM food.	CO 1Find the enzymes in rDNA technology CO 2Compare the cloning vehicles with their specific advantages CO 3Criticize the boon technology of *in-vitro* fertilization CO 4 Analyse the technique of tissue culture CO 5 Identify the importance of artificial blood
19PG4Z18	Developmental Biology	Global& National	This Course focuses on the developmental process from a single egg to zygote by fertilization, into blastula by Cleavage, followed by Gastrulation into Gastrula. From Gastrula, organ forming rudiments are	CO 1 Recalls the basic concepts of Developmental Biology. CO 2 Explain how fertilization, cleavage and Gastrulation occur. CO 3Compares the basic concepts of organogenesis in differentorganisms. CO 4Understand the development of egg into a foetus, then intoadult.

			formed, which give rise to the Organ Systems of the Organism.	CO 5 Associate the embryo development with Phylogeny.
19PG4ZE3	Economic Zoology	Local, National, Regional & Global	The course has great potential for creating self-employment and business opportunity	CO 1 Compare the morphological adaptation in bees in relation to their social behaviour CO 2 Plan for a sericulture unit as a cottage industry. CO 3 Analyse the rearing methods of prawn and pearl oysters. CO 4 Summarize the rearing methods of chick. CO 5 Assess the commercial importance of dairy farm
19PG4ZE4	Ethology	Local, National, Regional & Global	Students gain knowledge on learning, behaviour and biorhythm in animal.	CO 1 Classify different patterns of genetic, environmental, neural and hormonal animal behaviour CO 2 Explains the role of visual, auditory communication with respect to learning and instincts mechanism

				CO 3 Discuss the various reproductive and social behaviours in context to pair selection. CO 4 Summarizes the ecological condition such as hunger, thirst, territories etc., in influencing the animal behaviour. CO 5 Elaborate the molecular regulation of circadian rhythm
19PG4Z19	Lab in Environmental Biology & Developmental Biology	Local, National, Regional & Global	This course provides knowledge about the relationship between organisms and their environment. It also helps to learn about development of organisms.	CO 1 Find the primary productivity CO2 Demonstrate the estimation of various components of soil and water. CO 3 Identify the zoo planktons in water sample. CO 4 Analyse the various developmental stages of chick embryo CO 5 Compare the diversity of species by quadrat method.

19PG4Z20	Lab in Biotechnology, Economic Zoology & Ethology	Local, National, Regional & Global	This course provides rich knowledge in isolating DNA from different sources. It also helps to observe the behavioural pattern of selected animals.	CO 1Demonstrate the plant tissue culture technique. CO 2 Experiment with DNA isolation CO 3 Estimate DNA quantitatively CO 4 Analyse Newton's bee hive CO 5 Relate nest building in different birds