AQAR – QUALITATIVE METRIC

2022 - 2023

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: B.Sc ZOOLOGY

Programme Outcomes:

PO 1	Apply acquired scientific knowledge to solve complex issues.
PO 2	Attain Analytical skills to solve complex cultural, societal and environmental issues.
PO 3	Employ latest and updated tools and technologies to analyse complex issue.
PO 4	Demonstrated Professional Ethics that foster Community, Nation and Environment Building Initiatives.
PO 5	Apply the knowledge and skill to take up higher education, entrepreneurship and employment in government and private sectors.

Programme Specific Outcomes:

PSO 1	Gain comprehensive knowledge in different branches of Zoology – Invertebrata, Chordata, Cell biology, Physiology, Environmental Biology, Biochemistry, Microbiology, Immunology, Embryology, Entomology, Genetics, Molecular Biology, Biotechnology, Biostatistics, Bioinformatics and Evolution.
PSO2	Acquire technical skills in performing experiments in the field of Microbiology, Cell Biology, Biochemistry, Plant Physiology, Human Physiology, Molecular Biology, Environmental Biology, Developmental Biology, Biostatistics, Immunology, Evolution, Genetics, Clinical Laboratory Techniques, Biotechnology and Bioinformatics.
PSO 3	Develop empathy and instill love towards conserving plants and animals.
PSO 4	Express ideas and concept through seminar and assignments.
PSO 5	Solve the environmental problems by applying the biological principles for minimizing pollutants in air, water and land.
PSO 6	Develop environmental concern towards value of economically important plants, Biodiversity promote Bioremediation, Bio fertilizer and vegetative propagation.
PSO 7	Adopt Good Laboratory Practice, bioethics and biosafety guidelines to ensure minimal use of animals during experiments.

PSO 8	Exhibit the holistic growth by developing subject proficiency, interpersonal skills, and show vertical mobility in taking up PG courses and horizontal mobility by enrolling in B.Ed institution, clinical laboratory course and seek employment in schools, Medical coding and IT companies.
PSO 9	Make them self employed/ Entrepreneur in the field of Sericulture, Vermitechnology, Ornamental fish culture, Dairy farming, Apiculture, Mushroom cultivation and Horticulture.
PSO 10	Use of computers for Power point presentation, Virtual Dissection, analysis of bio-molecules using bioinformatics tools and computing biological data.
PSO 11	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**

19Z1CC1	Invertebrata	All the Three	This is an introductory taxonomy course to the Zoology Program which organizes the distribution of animals according to common characteristic features charted out by Linnaeus, all animals are classified into seven categories: kingdom, phylum, class, order, family, genus and species along with the type study.	CO 1 Recall the levels of organization of animal kingdom and describe the origin of metazoan. CO 2 Elaborate the general characteristics, Classes and general topics of Acoelomate unicellular and multicellular organisms CO 3 Determine the general characteristics, Classes and general topics of Coelomate Multicellular organism. CO 4 Analyse the general characteristics, Classes and general topics of Coelomate (Annelida and Arthropoda) Multicellular organisms. CO 5 Assess the general characteristics, classes and general topics of Coelomate (Mollusca and Echinodermata) multicellular organisms.
19Z1CC2	Cell Biology	Global &National	This course deals with the	CO 1 Identify the techniques involved in Cytology.

			study of structure and functions of the cell.	CO 2 Outline the structural organization of plasma membrane and endoplasmic reticulum. CO 3 Determine the structural and functional significance of Ribosomes, Golgi Complex, Lysosomes, centrioles and Mitochondria. CO 4 Analyze the structural organization and functional significance of nucleus and nucleic acids. CO 5 Correlate the dynamics of cell division with cancer invasion.
19Z1CC3	Lab-Invertebrata & Cell Biology	All the Three	This Course aims to develop Identify the salient features of Invertebrates and Preparation and use of Microscopic Slides.	CO 1 Recognizes the levels of organization among Invertebrates. CO 2 Illustrate the Skill of Dissection of Organisms CO 3 Recalls the Structure and Functions of Cellular Organelles. CO 4 Summarize the unique features of different Phyla among Invertebrates.

				CO 5 Demonstrate skill of handling Microscopes.
19Z1NME	Maternity and Child Health	National	This course intends to create awareness on women health problems and solutions and common problems and antenatal care during pregnancy. It aims to educate on public health, personal hygiene, and nutrition for children and pregnant mother.	CO 1 Recall the reproductive systems and women health problems. CO 2 Discuss the care taken during pregnancy and family planning methods. CO 3 Select the nutrition and immunization pattern for pregnant woman and children. CO 4 Describe the causes, symptoms, diagnosis and treatment of six killer diseases. CO 5 Analyze the causes, symptoms, diagnosis and treatment of urinary tract infection and sexually transmitted diseases.
19Z2CC4	Chordata	All the Three	This course imparts knowledge on the salient	CO 1 Recall the levels of organization among Chordates. CO 2 Bring out the general characters and

			features, classification and uniqueness of the Classes of Phylum Chordata.	classification of Chordates. CO 3 Distinguish between the Classes of Chordates. CO 4 Identify the Systematic Position of Animals. CO 5 Evaluate the unique features of each Class of Chordates.
19Z2CC5	Genetics	Global &National	This course concerned with the study of genes, genetic variation, and heredity in organisms	CO 1 Recall the Mendelian laws and highlight the different types of genetic interactions. CO 2 Illustrate the multiple gene inheritance and the mechanism of Linkage and Crossing over. CO 3 Determine the concept of sex determination and the patterns of inheritance. CO 4 Correlate the types of mutations with chromosomal abnormalities. CO 5 Infer the concepts in genetics to improve the livelihood.
19Z2CC6	Lab- Chordata &	All the	Focuses on understanding	CO 1 Recognizes the levels of organization among Chordates.

	Genetics	Three	the uniqueness of Chordates and genetic inheritance of characters in Man	CO 2 Classify Chordates upto class level. CO 3 Distinguish the Mendelian Traits as Dominant and Recessive. CO 4 Develops the skill of dissecting organisms and displaying. CO 5 Interprets the Pedigrees.
19Z2NME	Maternity and Child Health	National	This course intends to create awareness on women health problems and solutions and common problems and antenatal care during pregnancy. It aims to educate on public health, personal hygiene, and nutrition for children and pregnant	CO 1 Recall the reproductive systems and women health problems. CO 2 Discuss the care taken during pregnancy and family planning methods. CO 3 Select the nutrition and immunization pattern for pregnant woman and children. CO 4 Describe the causes, symptoms, diagnosis and treatment of six killer diseases. CO 5 Analyze the causes, symptoms, diagnosis and treatment of urinary tract infection and sexually transmitted diseases.

			mother.	
19Z3CC7	Human Physiology	Global &National	The course focuses on the complex organization of different organ systems and their functions.	CO 1 Associate the basic components and functions of the digestive system and their diseases. CO 2 Organise structure and functions of the respiratory and circulatory system and their diseases. CO 3 Recognize the organs and functions of urinogenital system and their disease. CO 4 Identify the organs, theories and functions of neuromuscular system and their diseases. CO 5 Analyze the structure and functions of Endocrine glands and sense organs and their disorder.
19Z3CC8	Environmental Biology	All the Three	Review of ecological concepts to the understanding of Environmental biology.	CO 1 Paraphrase the structure and function of the Ecosystems CO 2 Identify the characteristics of a population and their interactions. CO3 Categorize community characteristics and value natural

				resources. C04 Recognize the importance of Biodiversity and its conservation. CO5 Show the consequences of Human actions on global environment.
19Z3CC9	Lab- Human Physiology & Environmental Biology	All the Three	The course focuses on the interactions between organisms and the environment, and the consequence of these interactions in natural populations, communities and the ecosystems through experimental approach.	CO 1 Associate the effect of pH and temperature on salivary amylase activity in man. CO 2 Infer the qualitative analysis and estimation of biomolecules. CO 3 Compare the preparation of haemin and haemochromogen crystals. CO 4 Determine the amount of dissolved oxygen and carbon dioxide in the given water samples. CO 5 Prepare the models for food chain and food web in different ecosystem and identification of spotters.

19Z3SB1	Vermitechnology	All the Three	This course imparts knowledge on the culture of earthworms and the preparation of vermicompost by recycling the waste through teaching and fieldtrip and eventually motivate the learners to become an entrepreneur.	CO1 Identify the different species of earthworm and elucidate the biology of earthworms CO2 Classify the ecological group of earthworms and discuss the role of earthworm in diverse applications. CO3 Organize the methods of Vermicomposting and identify factors affecting vermicompost. CO4 Analyse the physical, chemical and biological properties and maintenance of vermicompost. CO5 Examine the economics and prospects of vermiculture as self – employment avenues.
19Z3ACQ1	Plant Diversity & Pathology	All the Three	To understand the structure & life cycle of Plant groups	CO 1 Recognize the structure, life cycle and economic importance of Algae & Fungi. CO 2 Identify the plant diseases & control methods and Lifecycle & uses of Lichens CO 3 Show general characters & life cycle of Bryophytes, Pteridophytes and

				Gymnosperms CO 4 Classify the Angiosperms & list their uses CO 5 Relate the plants to their economic uses
19Z3ACQ 2	Lab- Plant Diversity & Pathology		To understand the structure and function of different plant groups	CO1 Construct suitable micro preparations CO2 Construct sections of given plant materials with illustration and description CO3 Make use of dissection microscope to display the floral parts of Angiosperms CO4 Identify specimens and slides from Algae, Fungi,Lichens,Bryophytes, Pteridophytes and Gymnosperms included in the syllabus CO5 Identify the economically useful plants
19C3ACZ 1	Animal Diversity, Physiology &	National	This course is designed for the	CO 1 Outline the general characters with of invertebrate and chordata with reference to organization, symmetry,

	Genetics		chemistry student which discusses the branch of Zoology that deals with animal diversity, structure and function of various systems, development and inheritance of man.	body cavity CO 2 Explain the digestive system, role of enzymes, digestion and absorption of Carbohydrates, Protein and Fat in Man. CO 3 Distinguish between internal and external respiration in context to the mode and transport of gas exchange. CO 4 Summarize the structure and function of heart, Kidney, eye and ear. CO 5 Explain the Mendelian Laws Of Inheritance & Allelism
19C3ACZ 2	Lab- Animal Diversity, Physiology & Genetics		Students develop laboratory skills with identification of preserved	CO 1 Outline the Laboratory biosafety guidelines and good laboratory practices. CO 2 Dissect and mount the Body setae of Earthworm CO 3 List out the features of the given

			specimen, manipulation of prepared slides, dissections and display under the microscope	spotters *Amoeba, Taenia solium*, *Nereis*, *Amphioxus* (entire), *Anguilla* (Eel), Toad (*Bufo*), Cobra, Chamaeleon, Pigeon and various Syndromes. CO 4 Choose the appropriate qualitative test for the analysis of carbohydrates, proteins, lipids, urea and uric acid in the given sample CO 5 Illustrate the structure of human ear, eye and heart.
19Z4CC10	Microbiology	Global &National	This course deals with the study of microorganisms and its interaction with the environment.	CO 1 Examine the culturing methods and phenotypic identification of microbes CO 2 Examine the taxonomical classification, reproduction and genetic recombination in bacteria. CO 3 Elaborate the morphologic properties and cultivation of viruses. CO 4 Determine the role of microbes in the environment. CO 5 Correlate the technology of fermentation with the microbial production industrial products

19Z4CC11	Evolution	Global	"Nothing in Biology makes sense except in the light of Evolution" – Dobzhansky. The Course will provide a comprehensive knowledge on the history of evolutionary theories, evidences for evolution, origin of life, natural selection, speciation and	CO 1 Recognize the basic concepts of origin of life and evidences of evolution. CO 2 Paraphrase the theories of evolution CO 3 Examine the Modern synthetic theory and the factors causing variation. CO 4 Organize the types and salient features of natural selection and mimicry. CO 5 Interpret the concept of speciation and human evolution

			human evolution	
19Z4CC12	Lab-Microbiology & Evolution	All the three	To gain skills in analyzing the clinical and environmental samples and to learn basic techniques in microbiology and evolution	CO 1 Find the working Principle and Applications of instruments. CO 2 Demonstrate the microbiological techniques and water quality analysis CO 3 Identify the animals of evolutionary importance, adaptive coloration and in mimicry. CO 4 Identify the morphological evidences and the horse and human evolution model. CO 5 Analyze the Hardy – Weinberg equilibrium using beads.
19Z4SB2	Mushroom Cultivation	All the three	Develop basic knowledge in mushroom cultivation and spawn production	CO 1 State the prospects of mushroom cultivation CO 2 Devise a plan for mushroom production unit CO 3 Outline the techniques in cultivation, grading & processing of edible

				mushrooms CO 4 Identify and manage Insect-Pests and diseases affecting mushrooms. CO 5 Prepare a business plan for small scale enterprise
19Z4ACQ 3	Developmental Botany & Plant Breeding	All the Three	To study basic functioning of plant life.	CO1 Recall structure & functions of various plant tissues CO2 Paraphrase the mechanism of transpiration, photosynthesis, respiration & plant growth regulators CO3 Identify the structure & development Embryology of plant CO4 Examine techniques in the crop improvement programmes CO 5 Plan a home garden using horticultural techniques
19Z4ACQ 4	Lab-Developmental Botany & Plant	All the Three	To study basic functioning of plant life.	CO1 Illustrate the anatomy of Monocot and dicot stem , root and leaf CO2 Interpret experimental set ups in

	Breeding			plant physiology CO3 Apply the horticultural techniques of Cuttage and layerage CO4 Make use of emasculation technique CO5 Identify specimens and slides from Plant anatomy, Physiology, Embryology , Plant Breeding & Horticulture included in the syllabus.
19C4ACZ 3	Cell & Molecular Biology	National	This course is designed for the chemistry student which discusses the branch of Zoology that deals with Cell and Molecular Biology.	CO 1 Outline the general structure and function of a prokaryotic and eukaryotic cell. CO 2 Associate the structure and function of plasma membrane, mitochondria and endoplasmic reticulum CO 3 Summarize the structure of chromosome CO 4 Recall the structure and replication of DNA CO 5 Organize the events in translation, transcription and gene regulation in Prokaryotes

19C4ACZ 4	Lab- Cell & Molecular Biology	All the Three	Students develop laboratory skills with identification of preserved specimen, manipulation of prepared slides, dissections and display under the microscope	CO 1 Identify the squamous epithelial cells Under microscope CO 2 Dissect and mount the Polytene Chromosomes in the Salivary gland of *Chironomus* larva. CO 3 Interpret the mitotic stages from the squash preparation in Onion root tip CO 4 Recognize the features of the given spotters: Stages of Meiosis, Cellular organelles – Mitochondria, Endoplasmic reticulum, Golgi complex, Nucleus CO 5 Recall the structure and replication of DNA
19Z5CC1 3	Fundamentals of Biochemistry	Global &National	To familiarize the students with the structure and role of biomolecules and the	CO 1 Describe the structural, properties, biological significance of carbohydrates, proteins and lipids. CO 2 Classify lipids based on their complexity CO 3 Classify amino acids and proteins

			physiochemical processes of the living beings	based on their structure CO 4 Construct the flow chart to highlight the metabolic pathways of carbohydrates, proteins and lipids. CO5 List down the factors affecting the normal functions of the enzymes and biological functions of the vitamins.
19Z5CC14	Molecular Biology	Global &National	To understand the molecular processes of cells and the flow of genetic information and to appreciate the regulatory mechanisms of gene expression by the complex interactions of biomolecules.	CO 1 Illustrate the Watson and Crick model of DNA double helix; mechanism of DNA replication and the role of enzymes CO 2 Discuss the different types of DNA damages and repair mechanisms CO 3 Describe the transcription and translation in prokaryotes and eukaryotes CO 4 Discuss the post-transcriptional modifications, properties of genetic code and role of repressor in gene regulation CO 5 Employ the appropriate separation technique based on the size, shape,

				and charge of biomolecules
19Z5CC15	Lab-Biochemical Analysis	All the Three	This course introduces the students to the biochemical analytical experiments for Carbohydrates, Protein and Lipids by providing familiarization with the preparation of reagents, proper use of instrumentation and interpretation of the properties of the Biomolecules.	CO 1 Make use of the knowledge of basic principles of Biochemistry to carry out the biochemical experiments CO 2 Infer the outcome of the qualitative analytical tests of Biomolecules CO 3 Estimate the biomolecules using standard protocols CO 4 Develop skills in handling basic equipments CO 5 Develop familiarity with the principles of Laboratory safety
19Z5CC16	Lab-Molecular	All the Three	The course intends to	CO 1 Estimate the pH of different samples CO 2 Infer the color changes in DNA and

	Biology		provide hands on experience on techniques related to isolation and estimation of DNA & RNA	RNA estimation CO 3 Compute the Rf value for paper chromatography CO 4 Demonstrate the genomic DNA isolation, DNA estimation and chromatography CO 5 Solve the presence of nucleic acid in the given sample
19Z5ME1	Biostatistics	Global &National	To study the statistical significance data and analysis of the Biological aspects in life	CO 1 Outline the importance of data collection and its types. CO 2 Estimate and interpret the data, by various measures including mean, median, and standard deviation. CO 3 Apply the basic numeric and graphical techniques to display and summarize the collected data. CO 4 Interpret statistical results effectively in context to Correlation and Regression. CO 5 Choose and apply appropriate statistical methods for analyzing one or two variables.

19Z5ME2	Animal Behaviour	All the Three	Students gain knowledge on learning, behaviour and biorhythm in animal.	CO 1 Outline the scope and history of Ethology CO 2 Explain the types of learning CO 3 Summarize the methods adopted by the animals in mate selection. CO 4 Discuss the various parameters controlling the behaviour in context to nerve and hormone CO 5 Recall the types and features of biological rhythm
19Z5SB3	Ornamental Fish Culture	All the Three	To enable the students to be familiarized with ornamental fishes and to motivate them to become entrepreneur	CO 1 List the types of aquarium. CO 2 Plan the use of common aquarium ornamental fish and aquatic plants to decorate it. CO 3 Outline the physico – chemical parameters of water required for the growth of fish. CO 4 Explain the techniques followed in ornamental fish breeding. CO 5 Identify the symptoms of various diseases prevalent in ornamental fish.

19Z5SB4	Sericulture	All the Three	To motivate young minds to become an entrepreneur for practicing sericulture as cottage industry.	CO 1 List the importance of sericulture as cottage industry and the support provided by Central Silk Board. CO 2 Explain the different methods of vegetative propagation followed in mulberry cultivation. CO 3 Outline the life cycle of mulberry silkworm and the methods of rearing. CO 4 Organize the steps involved in processing of silk and its marketing. CO 5 Find various diseases that affect silkworm and cocoon formation
19Z6CC17	Basic Immunology	Global &National	To understand the immune system and immune response involved in human body. To help students develop the skills necessary for the critical	CO 1 Outline the types of immunity, immunization and origin of immune cells CO 2 Explain the structure and properties of antigen and antibody CO 3 Identify the antigen and antibody interactions and the steps involved in the immunological techniques CO 4 Illustrate the types and mechanism

			analysis of contemporary on topics related to health and disease.	of immune response and events in hybridoma technology CO 5 Describe the types of hypersensitivity reactions and autoimmune diseases
19Z6CC18	Principles of Biotechnology	Global &National	To familiarize the use of the techniques of engineering and technology in Biology for the study of living organisms, to modify products or processes for specific use. Also, to find solution of problems concerning human activities including agriculture, medical treatment,	CO 1 Identify the principles and applications of Biotechnology biosafety guidelines and IPR for the benefit of mankind CO 2 Discuss the tools and Techniques to manipulate DNA using rDNA technology for the development of transgenic plants, animals, and microbes or products for specific use CO 3 Describe basic techniques in animal cell culture and the application of stem cell production. CO 4 Summarize the biotechnology products and applications in the healthcare products, medicine, agriculture CO 5 Analyse the appropriate technology and application of biotechnology in industry and environmental sectors

			industry and environment	to increase SCP production and sewage management.
19Z6CC19	Lab-Immunology	All the Three	The overall objective of this course is to provide the undergraduate students of Zoology an experience of exploring immunological principles through experimentation and to introduce the procedures, basic techniques and instruments used in the clinical laboratories.	CO 1 Relate the knowledge of basic principles of immunology to carry out the related experiments CO 2 Acquire skills in handling basic equipments CO 3 Infer the outcome of the experiments of Immunology CO 4 Relate the biochemical properties of Glucose, Albumin & Ketone bodies while performing the qualitative analytical tests for their detection in urine sample CO 5 Develop familiarity with the principles of Laboratory safety
19Z6CC20	Lab-Biotechnolog	All the Three	Students gain hands-on experience and	CO 1 Acquire skills in handling basic equipments

	y		learn the theoretical basis of lab techniques common to a variety of biological disciplines such as biotechnology, Bioinformatics and Entomology and they will work in groups, learning how to collect, analyze, and present data while using the scientific method to conduct inquiry-based laboratory experiments.	CO 2 Identify the insects CO 3 Estimate the various biomolecules using standard protocols CO 4 Identify and comment on the spotters Agarose gel electrophoresis, SDS-PAGE, pBR322, Spirulina and Insulin and Bioinformatics tools CO 5 Examine the features in mouth parts of Cockroach & Honey bee, Pests of Agricultural Importance – Rice Weevil, Rhinoceros Beetle
19Z6ME3	Embryology	Global &National	This course imparts	CO 1 Recall the basic concepts of developmental biology.

			knowledge on the developmental process of egg to the formation of organism.	CO 2 Tell how fertilization, cleavage and gastrulating occur. CO 3 Compare the basic concepts of organogenesis in different organisms. CO 4 Relate the development of egg into a foetus, then into adult, among Vertebrates. CO 5 Associate the embryo development with Phylogeny.
19Z6ME4	Clinical Laboratory Technique	All the Three	Job oriented course provides current knowledge and upgraded skills in clinical laboratory techniques on the methods of testing the clinical samples	CO 1 List the different sterilization methods followed in clinical laboratory. CO 2 Explain the collection method and techniques used in laboratory for urine analysis. CO 3 Outline the method of blood collection and related analysis. CO 4 Find the way to process clinical specimens safely according to established procedures. CO 5 Utilize the knowledge of karyotyping in detection of congenital

				malformations.
19Z6ME5	Bioinformatics	Global &National	To enable the students to appreciate the significance of computational programs in the development and analysis of biological database	CO 1 Enumerate the applications of bioinformatics, web browsers and search engines and biological databases CO 2 Describe the flat file of UniProtKB, secondary and tertiary structure prediction CO 3 Employ the appropriate substitution matrices and global and local alignment and BLAST CO 4 Summarize the methods of multiple sequence alignment and phylogenetic tree CO5 Compute and develop Ramachandran plot and protein structure prediction
19Z6ME6	Entomology	All the Three	To learn about the classification, biology and control of insects and to	CO 1 List the different methods of insect collection. CO 2 Find the morphological modifications of insects with different functions.

			appreciate the importance of insects	CO 3 Summarize the beneficial aspects of insects.Lect CO 4 Explain the harmful effects of insects. CO 5 Identify the agricultural pests and the economic damage caused.
19Z6SB5	Apiculture	All the Three	To enable the students to be familiarized with Bee keeping techniques and to motivate them to become entrepreneur	CO 1 Explain the scope of apiculture in India CO 2 Recall the structure of honey bee CO 3 List the equipments used in bee keeping CO 4 Explain the extraction, Preservation and storage of honey CO 5 Outline the types of bee diseases
19Z6SB6	Dairy Farming	All the Three	To enable the students to be familiarized with management of high yielding cow species, preparation of value added	CO 1 Identify the features of various indigenous and exotic breeds of dairy cattles. CO 2 Discuss the management of new born calf, Heifer and milk cow. CO 3 Summarize the significance of Pasteurization in the preservation of

			products using milk and to motivate them to become an entrepreneur	the nutritive value of milk. CO 4 Develop an idea regarding the formulation of value added dairy products. CO 5 Describe the clinical findings, treatment and control measures of livestock diseases.