FATIMA COLLEGE (AUTONOMOUS), MADURAI – 625018
2020 - 2021

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)

On completion (after two years) of M. Sc ZOOLOGY, the graduates would be able to

PO 1	Acquire knowledge in the fundamentals concepts in Zoology and understand the complex interactions existing among various living organisms
PO 2	Analyse the interrelationship among various organisms and their relationship with their environment
PO 3	Develop the scientific temperament to carry out research project with professional ethics.

PO 4	Apply the knowledge and skills to take up entrepreneurship in the field of Apiculture, Sericulture, Fisheries, Dairy farming and Poultry.
PO 5	Enable the students to seek employability in academic, research institutions, state and central government sectors, bio-based and allied industrial sectors

PROGRAMME SPECIFIC OUTCOMES(PSO)

On completion (after two years) of M.Sc. Zoology programme, the graduates would be able to

PSO 1	Gain comprehensive knowledge in different branches of zoology – Cell & Molecular Biology, Biochemistry, Microbiology, Developmental Biology, Immunology, Genetics, Biotechnology, Bioinformatics and Evolution.
PSO 2	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.

PSO10	Make them self employed/ Entrepreneur in the field of Sericulture, Fisheries and Aquaculture, Dairy farming, Apiculture and Poultry.
PSO11	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 CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/ NATIONAL/ REGIONAL/ GLOBAL)	COURSE DESCRIPTION	COURSE OUTCOMES
19PG1Z1	Animal Diversity	All the Three	This course provides an overview of the	**CO 1:** Recall the levels of organization among Invertebrates and Chordates.

			Invertebrate and Vertebrate animals by focussing on the General characters, Classification, Special features and Biology of some selected Invertebrates and Vertebrates.	**CO 2:** Bring out the General characters of Invertebrates. **CO 3:** Classify the Phyla of Invertebrates and Chordates up to class level. **CO 4:** Distinguish between Invertebrates and Chordates. **CO 5:** Predict the systematic Position of Animals.
19PG1Z2	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 microscope

				CO 2: Classify bacteria based on morphology, biochemical characteristics and growth parameters **CO 3:** Discuss the morphology, classification and cultivation of viruses. **CO 4:** Explain the microbial genetics and metabolism of bacteria **CO 5:** Appraise the role of bacteria in food, industry, medicine, environment and agricultural microbiology
19PG1Z3	Cell & Molecular Biology	Global& National	This course deals with the central dogma of molecular biology and to understand the basis of heredity.	**CO 1:** Explain the ultrastructure and functions of Cytoskeletons and Plasma membrane **CO 2:** Discuss the complexity of eukaryotic genome organization and its replication in Prokaryotes & Eukaryotes

				CO 3: Describe the process of transcription and post transcriptional modification in Eukaryotes **CO 4:** Evaluate the regulation of transcription and translation in Prokaryotes & Eukaryotes **CO 5:** Assess the events of cell cycle, cell signalling pathways, cell death and cancer
19PG1Z4	Lab In Animal Diversity & Microbiology	All the Three	This course deals with the learning skills of microbial techniques and fundamentals of diversity of species.	**CO 1**: Identify the diversity of animals. **CO 2:** Explain the fundamental organization of cells. **CO 3:** Prepare different types of media. **CO 4:** Demonstrate bacterial isolation technique and maintain pure culture.

				CO 5: Identify unknown bacteria by biochemical testing.
19PG1Z5	Lab In Cell & Molecular Biology	All the Three	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:** Classify and sketch the various microscopy **CO 2:** Estimate the quantity of DNA and RNA **CO 3:** Infer the qualitative estimation of DNA and RNA **CO 4:** Organize the steps in isolation of genomic DNA **CO 5:** Interpret the mitotic stages of onion root tip
19PGZEDC1	Herbal Medicine	National & Regional	This course deals with the study of	**CO 1:** Make use of alternative medicinal methods.

			medicinal plants and therapeutic values of herbs.	**CO 2:** Outline the importance of herbs used in day today life. **CO 3:** Categorize the usage of herbs for different ailments. **CO 4:** Solve the life style disorders with food supplements. **CO 5:** Prepare various herbal products.
19PG2Z6	Genetics	Global& National	This course provides the knowledge of Mendelian inheritance and understanding the molecular basis of mutation which	**CO 1:** Classify the pattern of inheritance of traits by various crosses. **CO 2:** Identify the pattern of sex determination in various organisms. **CO 3:** Analyse the mechanism of crossing over and linkage **CO 4:** Determine the types of variation in chromosome.

			leads to genetic defects in human.	**CO 5:** Assess the process of bacterial recombination in microbial genetics.
19PG2Z7	Evolution	Global	To understand the origin of life on the earth through the process of evolution.	**CO1:** Outline the origin and evolution of life **CO2:** Categorize the evidences and theories of organic evolution **CO3:** Describe the mechanism of evolution **CO4:** Write about the natural selection and speciation **CO5:** Explain the molecular and human evolution
19PG2Z8	Biochemistry	Global& National	The course is designed to provide firm foundation in the principles of Biochemistry by	**CO 1**:Analyse the metabolic pathways of carbohydrates **CO 2:**Recall the structure, properties and metabolism of amino acids and Protein.

			providing knowledge on structure, biochemical properties of biomolecules and the role of these biomolecules in the major metabolic pathways of a living system.	**CO 3:** Assess the structure, properties and metabolism of Lipids **CO 4:** Identify the structural organization and metabolism of Nucleic Acids. **CO 5:** Describe the mechanism of enzyme and hormone action.
19PG2Z9	Lab in Genetics & Evolution	All the three	This course deals with the laboratory experiments that teach the concepts of inheritance of genes and to	**CO 1:** Determine the sex in man by Barr bodies. **CO 2:** Experiment with the simple mendelian traits.

			explore evolutionary dynamics.	**CO 3:** Examine the process of Sex determination in man and fruit fly. **CO 4:** Construct the Pedigree charts by systematic listing of parents. **CO 5:** Relate the genotypic frequencies by Hardy-Weinberg equilibrium.
19PG2Z10	Lab in Biochemistry	All the Three	Students gain hands-on experience and learn the theoretical basis of lab techniques common to a variety of biological disciplines such as Biochemistry and	**CO 1:** Find appropriate skills in handling basic equipment **CO 2:** Trace the strength of unknown solutions using formula to find the value **CO 3**: Estimate the various biomolecules using standard protocols and Design experiments to solve research problems **CO 4:** Apply the principles and procedures to

			they will work in groups, learning how to collect, analyze, and present data while using the scientific method to conduct inquiry-based laboratory experiments.	demonstrate the experiments **CO 5:** Assess the experiments with the data arrived and interpret the results
19PGZEDC2	Herbal Medicine	National & Regional	This course deals with the study of medicinal plants and therapeutic values of herbs.	**CO 1** Make use of alternative medicinal methods. **CO 2** Infer the importance of herbs used in day today life. **CO 3** Categorize the usage of herbs for different ailments.

				CO 4 Solve the life style disorders with food supplements. **CO 5** Prepare various herbal products.
Off Class	SPSS	Global& National	It provides hands on experience on the tools and techniques of SPSS statistical package.	**CO 1** Apply the knowledge of research to frame the questionnaire based on hypothesis **CO 2** Organize the data in the form of Chart and diagrams using SPSS **CO 3** Analyze the data using descriptive statistics, T test, correlation and regression **CO 4** Demonstrate ANOVA and Hierarchical Clustering using SPSS software **CO 5** Interpret 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 neurophysiology applied 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	**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.

			related disorders and vaccines.	
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

				CO 5: Parapharse the research work through documentation as a Thesis, Oral or Poster Presentation.
19PG3ZE1	Fisheries & Aquaculture	All the Three	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 and macromolecular structure prediction.	**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 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	All the Three	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

19PG3Z15	Lab in Immunology, Fisheries & Aquaculture and Bioinformatics	All the Three		**CO 1:** Explain the different lymphoid organs, properties of soluble and particulate antigen **CO 2:** Estimate the lymphocytes from peripheral blood and explain the biological databases NCBI **CO 3:** Construct various bleeding techniques and separation of serum and plasma and plan a visit to aquarium. **CO 4:** Examine the experiment with complement mediated lysis, Immune electrophoretic and rocket immunoelectrophoretic identification and single / double immunodiffusion

				CO 5: Analyze the sequences BLAST AND Claustral O and Assess the formation of precipitin line and button formation
19PG4Z16	Environmental Biology	All the Three	To understand the basic concepts of Ecology.	**CO 1:** Develop an understanding of ecological key interactions and processes **CO 2:** Explain the factors involved in determining population size, Density, Distribution &Community function **CO 3:** Analyse 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 1:** Find the enzymes in rDNA technology **CO 2:** Compare the cloning vehicles with their specific advantages **CO 3:** Criticize 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	**CO 1** Recalls the basic concepts of Developmental Biology.

			single egg to zygote by fertilization, into blastula by Cleavage, followed by Gastrulation into Gastrula. From Gastrula, organ forming rudiments are formed, which give rise to the Organ Systems of the Organism.	**CO 2** Explain how fertilization, cleavage and Gastrulation occur. **CO 3** Compares the basic concepts of organogenesis in different organisms. **CO 4** Understand the development of egg into a fetus, then into adult. **CO 5** Associate the embryo development with Phylogeny.
19PG4ZE3	Economic Zoology	All the Three	The course has great potential for creating self-employment and	**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.

			business opportunity	**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	All the three	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	All the three	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 **CO 2** 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	All the three	This course provides rich knowledge in isolating DNA from different sources. It also helps to observe the behavioural pattern of selected animals.	**CO 1** Demonstrate 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