



# FATIMA COLLEGE

(Autonomous)

*Affiliated to Madurai Kamaraj University*  
*Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)*  
Mary Land, Madurai - 625018, Tamil Nadu

## FATIMA COLLEGE (AUTONOMOUS), MADURAI – 625018

2021 - 2022

**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 outcomes (POs)

<b>PO1</b>	Apply Acquired knowledge to solve major and complex issues in the society/industry.
<b>PO2</b>	Attain research skills to solve complex Cultural, Societal and Environment issues.
<b>PO3</b>	Employ latest and updated tools and technologies to solve complex issues.
<b>PO4</b>	Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.
<b>PO5</b>	Develop the scientific temperament to carry out research project with professional ethics.



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## Programme specific outcomes (PSOs)

<b>PSO 1</b>	Gain comprehensive knowledge in different branches of zoology – Cell & Molecular Biology, Biochemistry, Microbiology, Developmental Biology, Immunology, Genetics, Biotechnology, Bioinformatics and Evolution.	
<b>PSO 2</b>	Interrelate the concepts of gene, genome, cell, tissue, organ and organ-system in the physiological adaptations, development, reproduction, behaviour of microbes, plants and animals	
<b>PSO 3</b>	Perform experiments in the field of Microbiology, Biochemistry, Cell & Molecular Biology, Environmental Biology, Developmental Biology, Biostatistics, Immunology, Genetics, Biotechnology and Bioinformatics.	
<b>PSO 4</b>	Develop empathy towards conservation of plants and animals and appreciate the diversity of animals and their inclusiveness in the sustenance of an ecosystem.	
<b>PSO 5</b>	Express ideas and concept through oral presentation and organize research data in the form of dissertation writing.	
<b>PSO 6</b>	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.	
<b>PSO 7</b>	Address the local, regional, national and global environmental issues and mitigating the same through Intervention strategies adopting standard protocol.	



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<b>PSO 8</b>	Practice judicious way of using animals in experiments, proper disposal of hazardous biological waste and ethics related to conserving endangered animals and plants.
<b>PSO 9</b>	Exhibit the holistic growth by developing interpersonal skills, subject proficiency, and to seek employability in clinical laboratory, Research institutions, Medical coding and IT companies.
<b>PSO 10</b>	Make them self employed/ Entrepreneur in the field of Sericulture, Fisheries and Aquaculture, Dairy farming, Apiculture and Poultry.
<b>PSO 11</b>	Use of computers for Power point presentation, Virtual Dissection, analysis of bio- molecules using bioinformatics software and computing biological data.
<b>PSO 12</b>	Healthy diet pattern for combat life style disorder.

## Course Outcomes (COs)

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.



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			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.
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<b>19PG1Z2</b>	<b>Microbiology</b>	Global& National	To understand the fundamentals of microbial diversity and applications of microbes in Industry and Environment.	<p>CO 1 Describe the scope of microbiology, taxonomical classification, principle and components of different types of microscopes</p> <p>CO 2 Classify bacteria based on morphology, biochemical characteristics and growth parameters</p> <p>CO 3 Discuss the morphology, classification and cultivation of viruses.</p> <p>CO 4 Explain the microbial genetics and metabolism of bacteria</p> <p>CO 5 Appraise the role of bacteria in food, industry, medicine, environment and agricultural microbiology</p>
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<b>19PG1Z3</b>	<b>Cell &amp; Molecular Biology</b>	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
<b>19PG1Z4</b>	<b>Lab In Animal Diversity &amp;</b>	All the Three	This course deals with the learning	CO 1 Identify the diversity of animals.



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	<b>Microbiology</b>		skills of microbial techniques and fundamentals of diversity of species.	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.
<b>19PG1Z5</b>	<b>Lab In Cell &amp; Molecular Biology</b>	All the Three	It includes cell biology experiments such as observation of mitotic stages in onion root tip and visualizing giant chromosome in <i>Chironomus</i> 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



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<b>19PG1ZED C</b>	<b>Herbal Medicine</b>	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 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.
<b>19PG2Z6</b>	<b>Genetics</b>	Global & National	This course provides the knowledge of Mendelian inheritance and understanding the molecular basis of mutation which	CO1 Classify the pattern of inheritance of traits by various crosses.  CO2 Identify the pattern of sex determination in various organisms.  CO3 Analyse the mechanism of crossing over and linkage  CO4 Determine the types of variation in





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			leads to genetic defects in human.	chromosome.  CO5 Assess the process of bacterial recombination in microbial genetics.
<b>19PG2Z7</b>	<b>Evolution</b>	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
<b>19PG2Z8</b>	<b>Biochemistry</b>	Global& National	The course is designed to provide firm foundation in the principles of	CO 1 Analyse the metabolic pathways of carbohydrates  CO 2 Recall the structure, properties and metabolism of amino acids and Protein.



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			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 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.
<b>19PG2Z9</b>	<b>Lab in Genetics &amp; Evolution</b>	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.  CO 3 Examine the process of Sex



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			explore evolutionary dynamics.	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.
<b>19PG2Z10</b>	<b>Lab in Biochemistry</b>	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 they will work in groups, learning	CO 1 Find appropriate skills in handling basic equipments 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 demonstrate the experiments CO 5 Assess the experiments with the data



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			how to collect, analyze, and present data while using the scientific method to conduct inquiry-based laboratory experiments.	arrived and interpret the results
<b>19PG2ZED C</b>	<b>Herbal Medicine</b>	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.



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<b>Off Class</b>	<b>SPSS</b>	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
<b>19PG3Z11</b>	<b>Biophysics</b>	Global& National	Biophysics which is an inter disciplinary course, deals with the discipline	CO 1 Classify the chemical bonds and forces  interacting between molecules and Determine  the theories involved in acidity and basicity



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			concerned with the application of the principles and methods of physics and the other physical sciences to the solution of biological problems.	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
<b>19PG3Z12</b>	<b>Immunology</b>	Global& National	The course intends to provide the biology of immune	CO 1 Summarize the overview of the immune system CO 2 Elaborate the structure and



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			system and mechanism of immune response, maturation of lymphocytes and major histocompatibility complex and immune system related disorders and vaccines.	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.
<b>19 PG3Z13</b>	<b>Biostatistics &amp; Research Methodology</b>	Global & National	This course deals with specific procedures or techniques used to identify and process	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-



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			the research data.	<p>Square test for testing of hypothesis</p> <p>CO 3 Compute degrees of relationship variables using Correlation and Regression analysis.</p> <p>CO 4 Examine the Concepts of Research and devise the Research Hypothesis</p> <p>CO 5 Paraphrase the research work through documentation as a Thesis, Oral or Poster Presentation.</p>
<b>19PG3ZE1</b>	<b>Fisheries &amp; Aquaculture</b>	All the Three	This Course focuses on Fisheries and Aquaculture of Finfishes, Marine Prawn, Pearl Oyster and Disease Management.	<p>CO 1 Identify the economically important fishes and fishery products.</p> <p>CO 2 Plans according to the recent concepts in fisheries management.</p> <p>CO 3 Distinguish the various aquaculture systems.</p> <p>CO 4 Organizes the type of hatchery, brood</p>





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				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.
<b>19PG3ZE2</b>	<b>Bioinformatics</b>	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	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



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			prediction.	based on the distance matrix  CO 5 Determine the secondary structure and three dimensional structure prediction methods
<b>19PG3Z14</b>	<b>Lab in Biophysics &amp; Biostatistics</b>	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



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				and significance for the statistical data
<b>19PG3 Z15</b>	<b>Lab in Immunology, Fisheries &amp; Aquaculture and Bioinformatics</b>	All the Three		<p>CO 1 Explain the different lymphoid organs, properties of soluble and particulate antigen</p> <p>CO 2 Estimate the lymphocytes from peripheral blood and explain the biological databases NCBI</p> <p>CO 3 Construct various bleeding techniques and separation of serum and plasma and plan a visit to aquarium.</p> <p>CO 4 Examine the experiment with complement mediated lysis, Immuno electrophoresis and rocket immuno electrophoresis identification and single / double immunodiffusion</p> <p>CO 5 Analyze the sequences BLAST AND ClustalO and Assess the formation of</p>



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				percipitin line and button formation
<b>19PG4Z16</b>	<b>Environmental Biology</b>	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 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
<b>19PG4Z17</b>	<b>Biotechnology</b>	Global & National	This course provides knowledge	CO 1 Find the enzymes in rDNA technology



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			about genetic engineering and rDNA technology and its application in gene therapy, cell culture and GM food.	CO 2 Compare the cloning vehicles with their specific advantages CO 3 Criticize the boon technology of <i>in-vitro</i> fertilization CO 4 Analyse the technique of tissue culture CO 5 Identify the importance of artificial blood
<b>19PG4Z18</b>	<b>Developmental Biology</b>	Global& National	This Course focuses on the developmental process from a single egg to zygote by fertilization, into blastula by Cleavage, followed by Gastrulation	CO 1 Recalls the basic concepts of Developmental Biology. 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 foetus, then into adult.



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			into Gastrula. From Gastrula, organ forming rudiments are formed, which give rise to the Organ Systems of the Organism.	CO 5 Associate the embryo development with Phylogeny.
<b>19PG4ZE3</b>	<b>Economic Zoology</b>	All the Three	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



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				dairy farm
<b>19PG4ZE4</b>	<b>Ethology</b>	All the Three	Students gain knowledge on learning, behaviour and biorhythm in animal.	<p>CO 1 Classify different patterns of genetic, environmental, neural and hormonal animal behaviour</p> <p>CO 2 Explains the role of visual, auditory communication with respect to learning and instincts mechanism</p> <p>CO 3 Discuss the various reproductive and social behaviours in context to pair selection.</p> <p>CO 4 Summarizes the ecological condition such as hunger, thirst, territories etc., in influencing the animal behaviour.</p> <p>CO 5 Elaborate the molecular regulation of circadian rhythm</p>
<b>19PG4Z19</b>	<b>Lab in</b>	All the Three	This course provides knowledge	<p>CO 1 Find the primary productivity</p> <p>CO 2 Demonstrate the estimation of</p>



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	<b>Environmental Biology &amp; Developmental Biology</b>		about the relationship between organisms and their environment. It also helps to learn about development of organisms.	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.
<b>19PG4Z20</b>	<b>Lab in Biotechnology, Economic Zoology &amp; Ethology</b>	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