

Department of Zoology
Nesamony Memorial Christian College, Marthandam
B. Sc. Zoology
Course Outcome

Semester – I B. Sc. Zoology					
Part	Course Name	Course Code	Credit	Hours	Course Outcome
Part - III	Core Course - I: Invertebrata	FCZO11	5	5	CO 1 Understand the basic concepts of invertebrate animals and recall its structure and functions. CO 2 Illustrate and examine the systemic and functional morphology of various groups of invertebrata. CO 3 Differentiate and classify the animal's mode of life in various taxa and estimate the biodiversity. CO 4 To compare and distinguish the various physiological processes and organ systems in lower animals. CO 5 Infer and integrate the parasitic and economic importance of invertebrate animals.
	Core Course - II: Lab on Invertebrata	FCZOP1	3	3	CO 1 Identify and label the external features of different groups of invertebrate animals. CO 2 Illustrate and examine the nervous system and reproductive system of invertebrate animals. CO 3 Differentiate and compare the structure, function and mode of life of various groups of animals. CO 4 Compare and distinguish the dissected internal organs of lower animals. CO 5 Prepare and develop the mounting procedure of economically important invertebrates.
Part - IV	SEC-1: Ornamental Fish Farming and Management	FSZO11	2	2	Students will able to CO 1 Highlight the importance of ornamental fish culture in entrepreneurship development. CO 2 Know the identification, culture and maintenance of commercially important ornamental fishes. CO 3 Acquire knowledge of the techniques of ornamental fish breeding, rearing, disease control and economics of ornamental fish farming.
	Foundation Course: Introduction to Zoology	FFZO11	2	2	CO 1 Know the different types of animals in the animal kingdom. CO 2 knowledge of the various branches of biology. CO 3 Attain knowledge on the livestock development in India and its future prospects
Semester – II B. Sc. Zoology					
Part - III	Core Course - III: Chordata	FMZO21	5	5	CO1 Classify, identify and recall the name and distinct features of different subphylum belonging to phylum Chordata. CO2 Explain, and relate the origin, structural organization and evolutionary aspects of vertebrates. CO3 Analyze, compare and distinguish the developmental stages and describe the important biological

					process. CO4 Correlate the different modes of life and parental care among different vertebrates. PO3, PO5, PO6 CO5 Summarise the morphology and ecological adaptations in vertebrates and list out the economic importance.
	Core Course - IV: Lab on Chordata	FMZOP2	3	3	CO1 Identify and label the external features of different groups of invertebrate animals. CO2 Illustrate and examine the nervous system and reproductive system of invertebrate animals. CO3 Differentiate and compare the structure, function and mode of life of various groups of animals. CO4 Compare and distinguish the dissected internal organs of lower animals. CO5 Prepare and develop the mounting procedure of economically important invertebrates.
Part - IV	SEC-2: Bio Composting for Entrepreneurship	FSZO21	1	2	The students will gain knowledge about the process of Biocomposting. CO1 Students will be able to demonstrate Biocomposting techniques for various end applications like solid waste management, industrial waste recycling using sugarcane bagasse, etc. CO2 To learn about the economic cost of establishing small Biocompost units as a cottage industry
	SEC-3: Animal Behaviour	FSZO22	1	2	CO1 Recall and record the genetic basis and evolutionary history of behaviour. CO2 Classify movement and migration behaviors and explain environmental influence upon behaviour. CO3 Analyze and identify innate, learned and cognitive behavior and differentiate between various mating systems. CO4 Assess complexity involved in behavioural traits and evaluate hormones and their role in aggression and reproduction. CO5 Discuss the rhythmicity of behavioural expressions and the scientific concepts in behavior and behavioral ecology.
	Naan Mudhalvan Course-1: Language Proficiency for Employability- Overview of English Communication*- Cambridge		2	2	
Semester – III B. Sc. Zoology					
Part - III	Core Course - V: Cell Biology	EMZO31	4	4	CO1 Integrate and assess the biochemical, cytological and histological tools to infer cellular basis of organization. Understand and recall the basic structure, origin and development of cell organelles.

					<p>CO2 Understand and recall the basic structure, origin and development of cell organelles.</p> <p>CO3 Analyse and differentiate cellular components based on structure, composition and inter and intra cellular interactions.</p> <p>CO4 Explain the role of cells and cell organelles in various biological processes.</p> <p>CO5 Understand the structure and complexity of cells and cell organelles.</p>
	Core Course - VI: Lab on Cell Biology	EMZOP3	2	2	<p>CO1 Identify and label the external features of different groups of invertebrate animals.</p> <p>CO2 Illustrate and examine the nervous system and reproductive system of invertebrate animals.</p> <p>CO3 Differentiate and compare the structure, function and mode of life of various groups of animals.</p> <p>CO4 Compare and distinguish the dissected internal organs of lower animals.</p> <p>CO5 Prepare and develop the mounting procedure of economically important invertebrates.</p>
	SEC-4: Economic Zoology	ESZO31	1	2	<p>CO1 Identify and label the external features of different groups of invertebrate animals.</p> <p>CO2 Illustrate and examine the nervous system and reproductive system of invertebrate animals.</p> <p>CO3 Differentiate and compare the structure, function and mode of life of various groups of animals.</p> <p>CO4 Compare and distinguish the dissected internal organs of lower animals.</p> <p>CO5 Prepare and develop the mounting procedure of economically important invertebrates.</p>
Part - IV	Naan Mudhalvan Course-2		2	2	
	EVS	EEVS31	2	2	<p>Upon completion of this course, Students would have</p> <p>CO1 To have a basic knowledge of Natural resources its classification, concepts, and natural resources of India.</p> <p>CO2 To obtain knowledge on different types of ecosystem</p> <p>CO3 To understand the values of biodiversity and conservation on global, national, and local scales</p> <p>CO4 To gain knowledge on different types of pollution in the environment</p> <p>CO5 To introduce the students in the field of Law and Policies and Acts both at the national and international level relating to environment.</p>
Semester – IV B. Sc. Zoology					
Part - III	Core Course - VII: Genetics and Evolution	EMZO41	4	4	<p>On completion of this course, students will;</p> <p>CO1 Understand the basis of inheritance and expression of genes.</p> <p>CO2 Correlate changes in genetic makeup and phenotypic changes in progeny.</p> <p>CO3 Analyse the causes of variations in genetic material and predict the effect in a population using different techniques and understand ‘DNA’ as the basic genetic material and regulation of gene expression.</p> <p>CO4 Interpret that process of evolution depends on genetic variation and know the major events in the</p>

					evolution.. CO5 Compile the factors contributing to gene expression changes and specify the changes contributing to evolution and perceive the micro evolutionary concepts and principle of macroevolution.
	Core Course - VIII: Lab on Genetics and Evolution	EMZOP4	2	2	CO1 Understand the basis of inheritance and expression of genes. CO2 Illustrate and examine the changes in the genetic makeup and phenotypic changes in the progeny. CO3 Compile the factors contributing to gene expression changes and specify the changes contributing to evolution. CO4 Compare and distinguish the dissected internal organs of lower animals. CO5 Prepare and develop the mounting procedure of economically important invertebrates.
Part - IV	SEC-5: Wildlife Conservation and Management	ESZO42	1	2	On completion of this course, students will; CO1 understand and recall the importance of wildlife, extinction and Conservation Approaches of wildlife. CO2 integrate and assess the National, and international approaches for biodiversity conservation. CO3 analyse and differentiate threats to wildlife, various action plans, and conservation strategies on wildlife of India to turn conflict into tolerance and coexistence. CO4 explain the role of PVA models, Wildlife conservation approaches, and limitations. CO5 construct and simulate National and International strategies for Conservation, Wildlife laws and ethics.
	Naan Mudhalvan Course-3		2	2	
	Value Education	EVBE41	2	2	CO1 Identify the contribution of social reformers and factors that influence social justice CO2 Compare and list the legal rights provided to women, children, Dalits, minorities and physically challenged as per human rights and Indian constitution CO3 Stay as a responsible citizen and raise voice for any violence against women CO4 analyze the prospects and challenges in mass media role of media in CO5 assess the influence of new media on children and youth and use them to inculcate communal harmony and social justice CO6 frame their own personal values based on social ethics to moderate the social issues and lead a secular society
Semester – V B. Sc. Zoology					
	CORE COURSE - 5.1 DEVELOPMENTAL ZOOLOGY	CMZO51	4	5	On successful completion of course the student will be able to CO1 find the processes right from fertilization of a single cell egg to the formation of a well structured and functional multicellular organism. CO2 understand and gain knowledge about the developmental stages like fertilization, cleavage and

					<p>gastrulation.</p> <p>CO3 compare the human embryo development to other animals and the regeneration, metamorphosis, transplantation and differentiations of stem cells in the organisms.</p> <p>CO4 identify the integrative aspects of building of organisms and examine the developmental abnormalities and other conditions such as cancer.</p> <p>CO5 analyse the developmental biology as a key subject in Zoology and justify it as a motor for research, in the human diseases and fertility.</p> <p>CO6 assume and conclude that the embryonic development provides a thorough knowledge to study other subjects like genetics, evolution, physiology, cell and molecular biology etc.,</p> <p>CO7 determine the mechanism and principles to develop an embryo.</p>
Part - III	CORE COURSE - 5.2 MICROBIOLOGY AND IMMUNOLOGY	CMZO52	4	5	<p>On successful completion of the course the student will be able to</p> <p>CO 1 understand the structure, classification and culture techniques of microbes.</p> <p>CO 2 analyse and distinguish food poisoning, food spoilage and preservation methods.</p> <p>CO 3 develop entrepreneurial skills with the knowledge on the role of microbes in fermentation, microbial products and the role of pathogens in human infectious diseases.</p> <p>CO 4 understand the concepts of immune system, cellular and molecular basis of immune responses, autoimmunity and immunoglobulins.</p> <p>CO 5 describe the different types of lymphoid organs, antigen- antibody reactions, cells of immune system and their functions.</p> <p>CO 6 infuse their knowledge on histocompatibility, and immunodeficiency to describe transplantation, vaccine and immunization techniques.</p>
	CORE PRACTICAL - V: DEVELOPMENTAL ZOOLOGY & MICROBIOLOGY AND IMMUNOLOGY	CMZOP5	2	3	<p>On successful completion of the practical course the student will be able to</p> <p>CO1 recollect the fundamental procedure of Developmental Zoology, Microbiology & Immunology.</p> <p>CO2 understand the principles and adopt the techniques for their future courses.</p> <p>CO3 describe the structure and classification of microbes and immunoglobulins.</p> <p>CO4 apply the theoretical knowledge of food preservation, fermentation and immunization schedule.</p> <p>CO5 evaluate the present situation to check any outbreak of contagious diseases.</p> <p>CO6 conclude the prevalence of diseases in adverse condition and able to formulate solution to manipulate/ manage the dangerous situation.</p>
	CORE COURSE-5.3: ANIMAL PHYSIOLOGY	CMZO53	4	5	<p>On successful completion of the course the student will be able to</p> <p>CO1 list out the physiological concepts in nutrition, digestion, metabolism, respiration etc.,</p> <p>CO2 compare the various physiological processes in the animals.</p> <p>CO3 identify the working mechanisms of effectors, homeostasis and understand how the animals adapt in</p>

					<p>the environments.</p> <p>CO4 analyse the fundamental interactions between physiology and endocrinology.</p> <p>CO5 justify the correlation of structure, coordination of functions and working system in the organs in the human body.</p> <p>CO6 determine and understand the various physiological disorders due to the imbalance of hormones, and metabolism.</p> <p>CO7 develop thorough knowledge about the structure and function of the organisms and execute the ideas in research projects.</p>
	CORE PRACTICAL - VI: ANIMAL PHYSIOLOGY	CMZOP6	1	3	<p>On successful completion of the practical course the student will be able to</p> <p>CO1 find and calculate the rate of oxygen consumption of a fish by Winkler's method.</p> <p>CO2 analyse the effect of temperature on physiological activity.</p> <p>CO3 verify the basic principles and appl it to solve the problem.</p> <p>CO4 compare the results and confirm the qualitative tests.</p> <p>CO5 design an experiment to prove the physiological principles and concepts.</p>
	CORE COURSE - 5.4: ECOLOGY	CMZO54	4	5	<p>On the successful completion of the course the student will be able to</p> <p>CO1 recall the principles, applications and concepts of ecology and ecosystem, how biotic and abiotic factors that are related to ecosystem.</p> <p>CO2 understand how the animals interact with each other and their natural environment.</p> <p>CO3 analyse and compare the differences in the structure and function of different types of ecosystem.</p> <p>CO4 emphasize the role of key factors responsible for changes in natural ecosystem such as pollution and urbanization and capable of pollution and other effects.</p> <p>CO5 interpret the diversity of species in relation to natural process and sustenance of life.</p> <p>CO6 apply the acquired knowledge in ecology to solve and manage the current environmental issues and problems.</p>
	CORE PRACTICAL - VII: ECOLOGY	CMZOP7	1	3	<p>On successful completion of the practical course the student will be able to</p> <p>CO1 compare and interpret the results of estimated the physicochemical parameters of the water samples.</p> <p>CO2 analyze and understand the planktonic adaptations.</p> <p>CO3 develop the skill to explain the ecological adaptations with specific examples.</p> <p>CO4 create awareness to conserve the natural habitat</p>
Part - IV	Skill Based Common: PERSONALITY DEVELOPMENT	CCSB51	2	2	

Semester – VI B. Sc. Zoology

	CORE COURSE - 6.1: EVOLUTION	CMZO61	4	5	On successful completion of the course the student will be able to CO1 understand the origin of life and evidences in favour of evolution CO2 accept the modern concept of evolution CO3 analyse the concept of evolution especially population genetics. CO4 learn relationship between abiotic and biotic factors adaptation in the view of evolution CO5 get thorough knowledge of the tree diagram of evolution of various animals and patterns of distribution
	CORE COURSE - 6.2: ANIMAL BIOTECHNOLOGY	CMZO62	4	5	On successful completion of the course the student will be able to CO1 relate the basic principles of recombinant DNA technology CO2 explain various molecular techniques used in modern biotechnology. CO3 categorise the cell and organ culture techniques. CO4 make use of hybridoma technology for the production of monoclonal antibody. CO5 compare the microbial enzyme and artificial enzymes CO6 explain the general principles of generating genetically modified organisms and modern artificial methods in biotechnology.
	CORE PRACTICAL - VIII: EVOLUTION & ANIMAL BIOTECHNOLOGY	CMZOP8	2	2	On successful completion of the practical course the student will be able to CO1 evaluate the gene frequency in the light of Hardy- Weinberg law and Probability. CO2 apply the known basic techniques for their projects and future studies. CO3 relate the evolutionary significances of the known organisms. CO4 understand and apply the biotechnological techniques for their higher studies. CO5 describe and evaluate the significance of the tools in biotechnology. CO6 develop a model prescribing the applications of biotechnology in day to day life.
	CORE COURSE - 6.3: BIostatistics, COMPUTER APPLICATIONS AND BIOINFORMATICS	CMZO63	4	5	On successful completion of the course the student will be able to CO1 attain an insight on statistical methods for analysis of biological data. CO2 undertake statistical operations in biology. CO3 gain basic understanding of computer hardware and software and use productive softwares effectively. CO4 acquire knowledge on the bioinformatic concepts for analyzing molecular data. CO5 analyse and use the bioinformatics tools for advanced sequence alignment, database searches, genome analysis and protein structure studies. CO6 understand and critically evaluate the data analysis procedures in publication of molecular biology research

	CORE PRACTICAL – IX: BIOSTATISTICS, COMPUTER APPLICATIONS AND BIOINFORMATICS	CMZOP9	1	2	On successful completion of the practical course the student will be able to CO1 remember the calculation and apply the formulae in their studies. CO2 use the technology to analyze the results of the experiments. CO3 understand and evaluate the data in the light of of bioinformatics tools. CO4 design a biological study to apply the learnt technology.
	CORE ELECTIVE COURSE - 6.4A: SERICULTURE	CEZO61	4	5	On successful completion of the course the student will be able to CO1 understand the scope sericulture and mulberry cultivation practices. CO2 gain knowledge on diseases of silkworms and pests of mulberry. CO3 understand the classification, life cycle and physiology of silkworm. CO4 apply the rearing methods, harvesting of cocoon and cocoon marketing. CO5 examine process of reeling, producing raw silk and marketing. CO6 decide to start sericulture unit/reeling unit in the local area and become notable entrepreneur.
	CORE ELECTIVE PRACTICAL- X: SERICULTURE	CMZOPA	1	2	On successful completion of the practical course the student will be able to CO1 understand the biological importance systems of the silkworm. CO2 appreciate the importance of feeding and rearing appliances CO3 enhance the production by applying scientific knowledge and training. CO4 decide to have a sericulture unit with less input.
	CORE ELECTIVE COURSE- 6.5A: APICULTURE	CEZO64	4	4	On successful completion of the course the student will be able to CO1 classify the honey bees and categorize its developmental stages and explain the principles of Apiculture and methods of Bee keeping. CO2 construct modern hives and rear and recommend apiary as a less expensive but profitable self employment. CO3 make use of Honey bee products and marketing. CO4 distinguish the enemies of bees and protect the bees from various diseases. and identify swarming, robbing and foraging behaviour of bees in an apiary. CO5 trust the less expensive but profitable self employment. CO6 gain confidence to establish an apiary after their graduation as a rural based and welfare oriented venture.

Semester – I Allied Zoology					
Part III	ALLIED ZOOLOGY - I: INVERTEBRATA	FEZO11	3	4	On completion of this course, students will CO1 Recall the characteristic features invertebrates and chordates. CO2 Classify invertebrates up to class level and chordates up to order level CO3 Explain and discuss the structural and functional organization of some invertebrates and chordates CO4 Relate the adaptations and habits of animals to their habitat CO5 Analyse the taxonomic position of animals.
	ALLIED ZOOLOGY LAB COURSE - I	FEZOP1	2	2	On Completion of this course, student will; CO1 Compare and distinguish the dissected internal organs of lower and higher animals. CO2 Prepare and develop the mounting procedure of important invertebrate and chordate anatomical parts and to appreciate the structure, function and mode of life. CO3 Identify and label the external features of different groups of invertebrate animals. PO4, PO6 CO4 Identify and label the external features of different groups of chordate animals. CO5 Understand and apply the theoretical knowledge. To plan the area of research and to identify different groups of invertebrate and chordate animals.
Semester – II Allied Zoology					
Part III	ALLIED ZOOLOGY - II	FEZO21	3	4	On completion of this course, students will CO1 Recall the parts and working of body organs and developmental stages, name the patterns of inheritance and list different types of animal behaviour. CO2 Analyse the different developmental stages. CO3 Analyse the working of body and immune systems. CO4 Analyse the different patterns of inheritance. CO5 Relate the behaviour of animals to physiology. Analyse the different types of behaviour
	ALLIED ZOOLOGY LAB COURSE - II	FEZOP2	2	2	On Completion of this course, students will; CO1 Compare the different types of excretory products and patterns of excretion. CO2 Examine the role of haemoglobin and Analyse the function of the heart, neurons and sense organs CO3 Identify and examine the developmental stages and their significance. CO4 Comprehend the role of genes and the pattern of inheritance CO5 Understand and apply the theoretical knowledge about immunization and behavioural types in daily life.