

# FOR DEPARTMENT OF Zoology

## PROGRAMME SPECIFIC OUTCOME

### 1) Programme Specific Outcome of M.Sc in Zoology

The Department of Zoology provides ample opportunity to the students to learn different branch of this umbrella subject along with three specializations. In the First Semester, there are four theory papers, one practical paper, and two optional elective (OE) papers to other disciplines. In the Second Semester also, this Department provides the same; however one OE paper. In the Third Semester also the same papers as in the First Semester. We provide three specializations in the fourth semester.

The courses included in the syllabus of Zoology are on various branches of Zoology to give a total knowledge about the subject. All the classic as well as modern updated lessons are included so that the students will be able to apply the knowledge in their future life. The practical papers are quite good to train the students hands on training so that after the degree, they could do entrepreneurship of their own. The knowledge they will acquire will also lead them to further study in this as well as related subjects.

## COURSE OUTCOME

SEMESTER-I	
<b>ZOO-101</b>	Zoology is an umbrella subject, where students do not only study the external morphology or internal mechanism in the body of an animal, but also to learn about how the animal is existing in nature. This paper will teach the students to understand the basic ecology and how mankind is related to nature with different other biotic and abiotic components. The outcome of this paper will be understanding of students about interactions among individuals in population and among species in community. This paper will enable the students to learn about the requirements of biodiversity.
<b>ZOO-102</b>	Cells are the structural and functional unit of life. ZOO-102 offers students to understand the types of cells, morphological complexities of cells, cell membrane dynamics, membrane receptors, and movement of molecules through the membranes. By completing this paper, students will understand the functioning of the cell membrane, membrane receptors, how cell communicate with each other, signaling pathways and the movement of molecules in and out of the cells.
<b>ZOO103</b>	The learners will be able to understand about the following concept: <ul style="list-style-type: none"><li>• Will be able to differentiate between the exocrine and endocrine gland.</li><li>• Know about the different locations and types of endocrine systems of mammalian vertebrates and insects.</li><li>• Know the different kinds of hormones and their roles in healthy life.</li><li>• Able to understand the chemical natures of hormones and their role in life cycle.</li><li>• Role of metabolic and physiological functions of hormones can be understood.</li><li>• Students will be able to understand the biosynthesis and different roles of steroid hormones, melatonin, medullary and thyroid hormone.</li><li>• Understand the medicinal and defensive role of hormones.</li><li>• Use of different insect hormones and pheromones in IPM can be understood.</li></ul>
<b>ZOO-104</b>	<b>Course Outcome of ZOO104</b>

	Through this course student will learn the process of formation of earth and origin of life on earth, understand the theories of evolution and latest developments in evolutionary biology, understand the evolutionary mechanism which has led to the development of diversity and adaptation in organisms and phylogenetic analysis. This will help develop an interest in discussions on evolutionary biology and for higher studies.
<b>ZOO105</b>	<b>Course Outcome of ZOO 105 (Practical)</b>
	Students will be able to experimentally determine the quality of water through estimation of various water quality parameters like Dissolved oxygen, free carbon dioxide, alkalinity, hardness, etc. Extraction of pituitary glands of fish, study of permanent histological slides of important endocrine organs and tissues. In connection to the theory courses, the students will also be able to learn about measurement of biodiversity and ecological applications.
<b>ZOO106E</b>	This course will help the students to learn about the biology and different advance techniques that are used in sericogenous industry. Besides, the course will help the students to understand different problems and their solution of this village base industry. It will support the students to become a self employed one.
<b>SEMESTER-II</b>	
<b>ZOO201</b>	<ul style="list-style-type: none"> <li>• Students will be able to learn about ovarian and testicular physiology:</li> <li>• Know about the menstrual cycle and its regulation, Female reproductive disorder, estrus cycle and its regulation.</li> <li>• Able to understand the mechanism of Fertilization events and Implantation</li> <li>• Able to understand the mechanism of prevention of Polyspermy, contraception</li> <li>• The developmental dynamics of the cell specification and embryonic stem cells and adult stem cells, haemopoietic stem cells.</li> <li>• Concept of morphogen gradients, role of paracrine factors in development, Hormonal control of amphibian metamorphosis</li> <li>• Able to understand the basics of IVF, ICSI, GIFT and ZIFT,</li> <li>• Able to develop the concept of teratogenesis and its principle, contribution of teratology to developmental biology.</li> </ul>
	<b>Course outcome for ZOO202</b>
<b>ZOO202</b>	Genes are the working units of the genome, the genetic composition of cells. ZOO-202 offers students to understand the functioning of genes and their regulations. By completing ZOO-202, students will understand the detailed mechanisms of gene function, expression, and gene regulation. The content of the syllabus will offer students to use this information for their higher studies.
<b>ZOO203</b>	<b>Course outcome for ZOO203</b>
	After studying this course, students will understand <ul style="list-style-type: none"> <li>• basic concepts and principles of biochemistry</li> <li>• Chemical nature of life and life process and the reactions involved in it.</li> <li>• structure and functioning of biologically important molecules</li> <li>• Create curiosity and generate an interest in the subject to explore the new developments in Biochemistry and also to inculcate research interest.</li> </ul>
	<b>Course outcome for ZOO204</b>
<b>ZOO204</b>	The study of biosciences using computer-based methods are covered under Bioinformatics. With the explosion of biological information, computers have been a part of biological studies for a long time. ZOO-204 offers students to understand the basics of various bioinformatics tools related to the

	<p>retrieval of biological data. By completing ZOO-204, students would be able to carry out sequence retrieval, sequence comparison study, and drug designing methodologies.</p> <p>Biostatistics is essential subject to learn for any study in zoological research. Students have to have basic knowledge about the subject so that they could apply in their dissertation work too. The two units in this paper will make enable the students to learn essential of biostatistics. The students will also learn the application of some of the basic statistical tests required for their practical uses.</p>
<b>ZOO205</b>	Students will be able to learn to perform biochemical estimations like preparation of buffers, enzyme assay, protein estimation etc. Students will learn different tools related to molecular biology and bioinformatics. Also, students will utilize practical applications of biostatistical tests.
<b>ZOO 206</b>	This paper will help the students to understand aquatic resources and their physic chemical characteristics. Also help to learn the Culture and breeding of economically important fishes. This study will help the students to take aquaculture as their livelihood.
<b>SEMESTER-III</b>	
<b>Course outcome for ZOO301</b>	
<b>ZOO301</b>	Instrumentation is an essential part of any scientific study. Knowledge of various biological instruments plays a crucial role in developing research methodologies. Paper ZOO-301 offers students a broad spectrum of biological tools and techniques required for daily practice and research analyses. By completing this paper, students will understand the very basics of chemical preparation to the most advanced method of gene manipulation and recombinant DNA technology. ZOO-301 also trains the students to design their experimental setup and incorporate various biological tools and techniques. ZOO-301 would enable the students to handle various histological, biochemical, and molecular practicals.
<b>ZOO302</b>	<ul style="list-style-type: none"> <li>• Students will be able to develop and generate thought of the mechanism of animal physiology.</li> <li>• Able to understand the role of respiration and blood in human health.</li> <li>• Able to understand the concept of circulatory mechanism in mammals.</li> <li>• Will be able to know about the role of different types of hormones and of enzymes in digestive functions.</li> <li>• Able to learn about the vision and hearing mechanism of eyes in human beings.</li> <li>• Able to understand the role of components of immune system of animal and human beings.</li> <li>• Able to understand the role of different defensive mechanism such as innate and adaptive immune responses.</li> <li>• Develop a concept of healthy living environment and surroundings.</li> <li>• Able to understand the mechanism of route of infection by the pathogens/antigens and the role of immune components in defending against foreign microbes/antigen.</li> </ul>
<b>Course outcome for ZOO303</b>	
<b>ZOO303</b>	Genetics, Cytogenetics, and Genetic Engineering are essential to understand the importance of allele and their inheritance. Paper ZOO-303 offers students to understand the gene, allele, and genotype, its expression, complex traits, effects of the epigenetic, environment on the gene, its complex inheritance, different damages, and related diseases. ZOO-303 would enable the students to understand and analyze the complex pattern of inheritance in the population, factors that can influence the role of the gene, how to construct gene libraries, and the role of genetic engineering.
<b>ZOO304</b>	<b>Course outcome for ZOO304</b>
	Students will learn about the general structure and functions of insects' body parts and their functions.

	<p>Students will also aware about the economically important insects and their management. They also learn about the insects those are related to transmit various diseases to animals and men.</p> <p>Through this course students will learn the rich diversity of marine, freshwater and brackish water resources and the diversity of fish species in India. They will also understand the physicochemical characteristics of different types of water resources in India and their current status. Students will also learn about fish post harvest technology and strategies for fish preservation.</p>
<b>ZOO305</b>	<b>Course outcome 305</b>
	<p>Students will be able to identify different fish species, and fishing crafts and gears and their operation. Blood groups and estimation of haemoglobin.</p>
<b>ZOO306E</b>	<b>Course outcome 306</b>
	<p>Students will understand the biochemical properties and role of different types of nutrients in humans. They will also learn the process of digestion, absorption and assimilation of nutrients by the body. This course will make the students aware about proper feeding habit, balanced diet and nutritional requirement for different category of persons. The nature, causes, treatment and prevention of various metabolic diseases will also be learnt.</p>
	<b>Special Paper-Molecular Biology and Immunology</b>
<b>ZOO401C</b>	<p>Gene manipulation and genetic engineering is important part of modern and advanced biological sciences. ZOO-401C offers students an understanding of the various gene manipulation techniques and how those techniques can be used to carry out genetic engineering. By completing this paper, students would be able to go for cell culture, comparative genome study and gene cloning processes. ZOO-401C enlightens the students with several molecular detection techniques such as mutation detection, mutagenesis and protein engineering.</p>
<b>ZOO402C</b>	<p>Biomolecules are the molecules of life, the functioning of which determine the phenotypic and genotypic characteristics of a cell and an organism. ZOO-402C offers students to understand cell membrane structure and functions, various cellular energetics, cell cycle dynamics and cell death leading to cancer disease. By completing this paper, students will understand the details of cellular mechanisms, cell motility and the molecular details of cancer.</p>
<b>ZOO403C</b>	<p>Molecular Immunology is important in understanding the vital role of the immune system in defending and causing disease. ZOO-403C offers students an understanding of the various immune cell and how those cells behave during the normal condition and on infections. By completing this paper, students would be able to understand the detailed role of each immune cell, their regulations, diseases related to the immune system, how to detect the clinical immunological markers through different techniques in understanding a specific disease and types and role of vaccines.</p>
	<b>Specialisation- Wildlife Ecology</b>
<b>ZOO401 WE</b>	<p>Wildlife Ecology is another important branch of Zoology which is essential for wildlife conservation. This paper will introduce students about the basics about wildlife, taxonomy, distribution of wild animals in different habitats.</p>
<b>ZOO402 WE</b>	<p>In this paper whatever students have learnt in the general Zoology, people will be understanding more deeper knowledge about population ecology, community ecology and behavioural ecology. These knowledge together will help them to understand conservation ecology with the examples of few case studies.</p>
<b>ZOO403</b>	<p>From this paper, the students will learn about the application of wildlife science in conservation</p>

<b>WE</b>	including management. The knowledge about the modern technology and conservation genetics will enable them to go for future research work.
<b>ZOO404 WE</b>	This paper will give the students exposure to field conditions. They will learn about the application of different tools and techniques in wildlife research. They will also learn how to analyze the data collected in related to wildlife research. They will be trained how to present seminar in proper way.
<b>ZOO-405</b>	The dissertation work will make students to experience with different conditions in wildlife research, which might bring out some research papers also. This experience and learning will be good for future research.
<b>Special Paper-Fish and Fisheries Science</b>	
<b>ZOO401F</b>	<ul style="list-style-type: none"> <li>• Learners will be able to understand the mechanism of feeding, digestion and gas exchange in fish.</li> <li>• Students will be able to learn about the fish circulatory and excretory System.</li> <li>• Different types of reproductive and endocrine system will be understood.</li> <li>• By studying endocrine systems, students will be able to become familiar with different types of hormones and their metabolic and physiological functions.</li> <li>• They will also understand the adaptive mechanisms of aquatic habitat like bioluminescence and reception in fish.</li> <li>• Role of immunity, stress and diseases in fish can be understood and develop an idea of successful maintenance of fish culture in students' career building.</li> </ul>
<b>ZOO402F</b>	Fish is one of the most diverse groups of animals on earth. Through this paper students will be able to understand the diversity of fish species in India, their distribution, identification and nature. Students will also understand the morphometric and population studies, various fishing technologies and fish processing technologies which will improve their understanding of the subject and its applications. Students will also learn about the principles of aquatic toxicology and its mitigation.
<b>ZOO403F</b>	<b>Course outcome 403F</b>
	Through this course the students will learn the science of aquaculture and how to successfully culture and breed important food fish of India. This course will also make the learner understand the nutritional requirements of cultivable fish and their feeding habit. Students will be able to identify different types of Nutrients and Anti nutritional factors present in feed ingredients, their mitigation and formulate artificial diet.
<b>ZOO404F</b>	<b>Course outcome 404F</b>
	This course is aimed to give the students hands on experience in handling fish and water quality experiments. Experiments in this course will make the students able to Identify important fish species and understand anatomy and morphology of the various organ and organ system of different fish. Student shall be able to induce breed fish, determine fish population stock, prepare artificial diet for fish and determine the water quality parameters experimentally.
<b>ZOO405F</b>	<b>Course outcome 404F</b>
	After studying this course, student will learn the basic of writing a thesis or a scientific paper. Basic skill in research methodology like Literature search, experimental design, formulating research hypothesis and writing skill will be improved and this may be helpful for their venture in the field of research later on.

