

## 2.6.1 Programme Outcomes (POs) and Course Outcomes (COs)

### MSC ZOOLOGY

<b>Programme objectives:</b>
<ul style="list-style-type: none"><li>• To provide quality education in Zoology at post-graduate level and to enable the learners to take certification of Master's degree in Zoology,</li></ul>
<ul style="list-style-type: none"><li>• To provide an in-depth knowledge and hands-on training to science graduate in the area of Zoology and enable them to specialise in one of the branches of Zoology that would be offered as elective courses,</li></ul>
<ul style="list-style-type: none"><li>• To provide the learners opportunities of continuing education and professional development,</li></ul>
<ul style="list-style-type: none"><li>• To widen the scope of the learners for careers in different sectors of employment,</li></ul>
<ul style="list-style-type: none"><li>• To enable the students to avail career opportunities in teaching, industry and research e.g. M. Phil/ Ph. D. programmes.</li></ul>

<b>Programme specific outcome:</b>
<ul style="list-style-type: none"><li>• To train academically sound future researchers and intellectuals in the area of general biology, with emphasis in areas on the cutting edge of modern biology, e.g., Molecular biology, Biotechnology, Genetics, Cell biology, and Environmental Conservation.</li></ul>
<ul style="list-style-type: none"><li>• To contribute to discoveries and innovations in these aspects of the biological science discipline through research.</li></ul>
<ul style="list-style-type: none"><li>• To provide expert counsel and consultancy services to national and international organizations on issues relating to Zoology.</li></ul>
<ul style="list-style-type: none"><li>• To instill qualities of self-confidence and self-reliance in animals in prospective young biologist</li></ul>
<ul style="list-style-type: none"><li>• To Train them to be teachers ,researchers and help them t take up other career related to zoology</li></ul>

### FIRST SEMESTER

<b>ZO211- Systematics and Evolutionary biology</b>
<b>Course objectives:</b>

<ul style="list-style-type: none"> <li>• To give a thorough understanding in the principles and practice of systematics</li> </ul>
<ul style="list-style-type: none"> <li>• To help students acquire an in-depth knowledge on the diversity and relationships in animal world</li> </ul>
<ul style="list-style-type: none"> <li>• To develop an holistic appreciation on the phylogeny and adaptations in animals</li> </ul>
<ul style="list-style-type: none"> <li>• To enable the students to understand the evolution of universe and life</li> </ul>
<ul style="list-style-type: none"> <li>• To provide an understanding on the process and theories in evolutionary biology</li> </ul>
<ul style="list-style-type: none"> <li>• • To help students develop an interest in the debates and discussion taking place in the field of evolutionary biology</li> </ul>

### **ZO212-Biochemistry**

#### **Course objectives:**

- To understand the chemical nature of life and life process
- To provide an idea on structure and functioning of biologically important molecules
- To generate an interest in the subject and help students explore the new developments in biochemistry

### **ZO213-Biophysics, instrumentation and computer science**

#### **Course objectives:**

- To learn the biophysical properties and functioning of life processes
- To introduce the tools and techniques available for studying biochemical and biophysical nature of life
- To equip the learner to use the tools and techniques for project work/ research in biolo
- To impart concepts, generate enthusiasm and make awareness about the tools/gadgets and accessories of biological research
- To equip the learner to carry out original research in biology
- To help the students to improve analytical and critical thinking skills through problem solving
- To provide hands on training in the use of various tools and techniques suggested in the course

### **ZO214Practical**

## **SECONDSEMESTER**

### **ZO221- Advanced Physiology and functional anatomy**

#### **Course objectives:**

<ul style="list-style-type: none"> <li>• To study and compare the functioning of organ systems across the animal world</li> </ul>
<ul style="list-style-type: none"> <li>• To give an over view of the comparative functioning of different systems in animals</li> </ul>
<ul style="list-style-type: none"> <li>• To learn more about human physiology and anatomy</li> </ul>

### **ZO222-Genetics quantitative analysis and research methods**

#### **Course objectives:**

<ul style="list-style-type: none"> <li>• To give an in-depth understanding on the principles and mechanisms of inheritance</li> </ul>
<ul style="list-style-type: none"> <li>• To help study the fine structure and molecular aspects of genetic material</li> </ul>
<ul style="list-style-type: none"> <li>• To provide an opportunity to learn the importance of inheritance in Man</li> </ul>
<ul style="list-style-type: none"> <li>• • To expose the learners to the emerging field of research and equip them the various research methodologies</li> </ul>

### **ZO223- Cell and Molecular Biology**

#### **Course objectives:**

<ul style="list-style-type: none"> <li>• To help study the structural and functional details of the basic unit of life at the molecular level</li> </ul>
<ul style="list-style-type: none"> <li>• To motivate the learner to refresh and delve into the basics of cell biology</li> </ul>
<ul style="list-style-type: none"> <li>• To introduce the new developments in molecular biology and its implications in human welfare</li> </ul>

### **ZO224- Practical**

## **THIRD SEMESTER**

### **ZO231- Microbiology and Biotechnology**

#### **Course objectives:**

<ul style="list-style-type: none"> <li>• To provide an over view of the microbial world, its structure and function</li> </ul>
<ul style="list-style-type: none"> <li>• To familiarize the learner with the applied aspects of microbiology</li> </ul>
<ul style="list-style-type: none"> <li>• To give students an intensive and in-depth learning in the field of biotechnology</li> </ul>
<ul style="list-style-type: none"> <li>• To understand the modern biotechnology practices and approaches with an emphasis in technology application, medical, industrial, environmental and agricultural areas</li> </ul>
<ul style="list-style-type: none"> <li>• To familiarize the students with public policy, biosafety, and intellectual property rights issues related to biotechnology</li> </ul>

**ZO232-Ecology ,Ethology and Biodiversity****Course objectives:**

- To provide an understanding on the basic theories and principles of ecology
- To help study various disciplines in ecology
- To learn current environmental issues based on ecological principles
- To gain critical understanding on human influence on environment
- To expose students to the basics and advances in ethology, and generate an interest in the subject in order to understand the complexities of both animal and human behavior

**ZO233-Immunology and Advanced Developmental Biology**

- To provide an intensive and in-depth knowledge to the students in immunology
- To help the learner to understand the role of immunology in human health and well-being
- To familiarize the students the new developments in immunology
- To introduce the concepts and process in developmental biology
- To help students understand and appreciate the genetic mechanisms and the unfolding of the same during development
- To expose the learner to the new developments in embryology and its relevance to Man

**ZO234-Practical****FOURTH SEMESTER****Environment science****ZO241—Pollution Biology and environment physiology****ZO242-Environment management****Course objectives:**

- To provide a broad and deep understanding on environment and influence of man on environment
- To equip the students to use various tools and techniques for the study of environment
- To enable the learner to understand, think and evolve strategies for management and conservation of environment for sustaining life on earth
- To take up further studies and research in the field

**ZO243-Practical I****ZO244-Practical II**

## **OBJECTIVES OF BSC ZOOLOGY DEGREE PROGRAMME**

### **Programme objective**

The B.Sc. Zoology programme is designed to help the students to:

1. Impart basic knowledge of various branches of Zoology and General biology meant both for a graduate terminal course and for higher studies.
2. Inculcate interest in and love of nature with its myriad living creatures.
3. Understand the unity of life with the rich diversity of organisms and their ecological and evolutionary significance
4. Acquire basic skills in the observation and study of nature, biological techniques, experimental skills and scientific investigation
5. Acquire basic knowledge and skills in certain applied branches to enable them for self employment
6. Impart awareness of the conservation of the biosphere.

### **Programme specific Outcomes:**

The graduate of this programme should be able to

1. Identify and list out common animals
2. Explain various physiological changes in our bodies
3. Analyze the impact of environment on our bodies
4. Understand various genetic abnormalities
5. Develop respect for nature
6. Explain the role and impact of different environmental conservation programmes
7. Identify animals beneficial to humans
8. Identify various potential risk factors to health of humans
9. Explain the importance of genetic engineering
10. Use tools of information technology for all activities related to zoology

## First semester core zoology

<b>ZO1241 ANIMAL DIVERSITY -I</b>
<b>Course objective:</b>
<ul style="list-style-type: none"><li>• To be familiar with the different nonchordate phyla.</li></ul>
<ul style="list-style-type: none"><li>• To know the general and distinguishing characters of each phylum through examples</li></ul>
<ul style="list-style-type: none"><li>• To study how the different systems evolved in their complexity.</li></ul>
<ul style="list-style-type: none"><li>• To compare and contrasts the life processes in different phyla</li></ul>
<ul style="list-style-type: none"><li>• To learn the basis of systematic and understand the hierarchy of different categories</li></ul>
<ul style="list-style-type: none"><li>• To obtain an overview of economically important invertebrate fauna</li></ul>
<b>LEARNING OUTCOME:</b>
At the end of the course, the students will be familiar with the non-chordate world that surrounds us. They will be able to appreciate the process of evolution and see how it progressed from simple, unicellular cells to complex, multicellular organisms. Students will be able to identify the invertebrates and classify them upto the class level with the basis of systematic s.Students will understand the basis of life processes in the non-chordates and recognise the economically important invertebrate fauna.

## Second semester in zoology

<b>ZO1241 ANIMAL DIVERSITY II:</b>
<b>Course objective:</b>
<ul style="list-style-type: none"><li>• <b>To learn the general characteristics and classification of different classes f vertebrates</b></li></ul>
<ul style="list-style-type: none"><li>• <b>To understand the vertebrate evolutionary tree</b></li></ul>
<ul style="list-style-type: none"><li>• <b>To understand the general aspects of applied interest</b></li></ul>
<b>LEARNING OUTCOME:</b>
To provide the students with an in-depth knowledge of the diversity in form, structure and habits of vertebrates

## Third Semester in Zoology

<b>ZO1341-Methodology and Perspectives of Zoology</b>
<b>Course objective:</b>

<ul style="list-style-type: none"> <li>• To learn the fundamental characteristics of science as a human enterprise</li> </ul>
<ul style="list-style-type: none"> <li>• To understand how science works</li> </ul>
<ul style="list-style-type: none"> <li>• To study to apply scientific methods independently</li> </ul>
<b>LEARNING OUTCOME:</b>
To enable students to systematically pursue zoology in relation to other disciplines that come under rubric of science

#### Fourth Semester in Zoology

<b>ZO1441 CELL BIOLOGY:</b>
<b>Course objective:</b>
This course will give firm and rigorous foundation in the principles of modern molecular and cellular biology. It discusses the fundamental processes that enable cells to grow, move and communicate and will cover topics such as cell architecture, cell chemistry, cell division, functions and cell cycle.
<b>LEARNING OUTCOME:</b>
Upon successful completion of the course, students will be able to:
Develop deeper understanding of what life is and how it functions at cellular level.
Describe cellular membrane structure and function, fine structure and function of cell organelles.
Perform a variety of molecular and cellular biology techniques

<b>PRACTICALS</b>
<b>Practical I-Methodology and Perspectives of zoology ,Animal diversity I and II</b>
<b>Course objective:</b>
<ul style="list-style-type: none"> <li>• To familiarise students with conventional organsystem in common ,easily available animals</li> </ul>
<ul style="list-style-type: none"> <li>• To emphasise the adage that seeing is believing typical examples and economically important specimen (preserved) to be studied.</li> </ul>
<b>Learning outcome:</b>
The students can gain experience in anatomy through simple dissection and mounting

## FIFTH SEMESTER IN ZOOLOGY

<b>ZO1541-Genetics and biotechnology</b>
<b>Course objective:</b>
<ul style="list-style-type: none"><li>• To learn the mechanism of crossing over and inheritance pattern in man.</li><li>• To understand the principles and techniques involved in DNA technology and get an overview of modern techniques like PCR ,hybridoma technology, gene therapy and human cloning.</li></ul>
<b>Learning outcome:</b>
The students will gain knowledge about the underlying genetic mechanism and state of the art biotechniques.

<b>ZO1542-Immunology and biotechnology:</b>
<b>Course objective:</b>
<ul style="list-style-type: none"><li>• To enable students to understand the principles and mechanism of immunology</li><li>• To learn the malfunctioning and disorders of immune system</li><li>• To get a broad understanding of microbes and their economic importance with special reference to pathogenic forms</li></ul>
<b>Learning outcome:</b>
Student gets updated on the scope and importance of clinical immunology and create an awareness about inherent dangers of microbes.

<b>ZO1543: Physiological and biological chemistry</b>
<b>Course objective:</b>
<ul style="list-style-type: none"><li>• <b>To study the different systems and inherent disorders/deficiency involved therein</b></li><li>• <b>To learn the structure and function of bio molecules and their role in metabolism</b></li></ul>
<b>Learning outcome:</b>
The students perspective of health and biology through indepth study of human physiology is improved.

## Sixth Semester in Zoology



<b>ZO1621-General informatics ,bioinformatics and molecular biology</b>
<b>Course objectives:</b>
<ul style="list-style-type: none"> <li>• To review the basic concepts and functional knowledge in the field of informatics</li> </ul>
<ul style="list-style-type: none"> <li>• To create awareness about nature of the emerging digital knowledge society</li> </ul>
<ul style="list-style-type: none"> <li>• To create awareness about social issues and concerns in the use of digital technology</li> </ul>
<ul style="list-style-type: none"> <li>• To learn the nature ,application and scope of bio informatics</li> </ul>
<b>Learning outcome:</b>
Students are equipped to effectively utilise the digital knowledge resources for the study of zoology and to expand basic informatics skill and attitudes relevant to the emerging society

<b>ZO1641:Developmental biology and experimental embryology</b>
<b>Course objectives:</b>
<ul style="list-style-type: none"> <li>• To study the various stages involved in the developing embryo</li> </ul>
<ul style="list-style-type: none"> <li>• To study the initial developmental procedures involved in <i>Amphioxus</i>, frog and chick</li> </ul>
<ul style="list-style-type: none"> <li>• To procure information on the state of the art experimental procedures in embryology</li> </ul>
<b>Learning outcome:</b>
The student is familiarised with the principle of developmental biology and provide him a bird`s eye of sophisticated embryological techniques

<b>ZO1642: Ecology,ethology ,evolution and zoogeography</b>
<b>Course objectives:</b>
<ul style="list-style-type: none"> <li>• To learn the principles application and management of environmental science</li> </ul>
<ul style="list-style-type: none"> <li>• To study the inherent morphological and physiological bases of behavioural pattern exhibited by vertebrates</li> </ul>

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| <ul style="list-style-type: none"><li>• To get an exhaustive knowledge of organic evolution with special reference to man</li></ul> |
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<b>Learning outcome:</b>
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To enhance the students concept of nature and her resources and appreciating the process and product of organic evolution.
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<b>Practical II-ZO1643-Cell biology ,genetics ,Biotechnology ,Immunology and microbiology</b>
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<b>Course objective:</b>
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| <ul style="list-style-type: none"><li>• To prepare and observe chromosomal arrangements during cell division</li></ul> |
| <ul style="list-style-type: none"><li>• To study chromosomal aberration in man</li></ul>                               |
| <ul style="list-style-type: none"><li>• To gain broad knowledge of conventional biotechnological procedures</li></ul>  |
| <ul style="list-style-type: none"><li>• To perform routine blood analysis</li></ul>                                    |

<b>Learning outcome:</b>
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To expertise the student to carry out routine hematological and microbiological techniques
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<b>Practical III-Physiology and biological Chemistry ,Molecular Biology and bioinformatics</b>
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<b>Course objectives:</b>
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| <ul style="list-style-type: none"><li>• To learn clinical procedures of blood and urine analysis</li></ul>                |
| <ul style="list-style-type: none"><li>• To make the student skilful in simple biochemical laboratory procedures</li></ul> |

<b>Learning outcome:</b>
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To demonstrate basic principles in Physiology.
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<b>Practical IV-Developmental biology ,Ecology ,ethology ,evolution and zoogeography</b>
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<b>Course objectives:</b>
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| <ul style="list-style-type: none"><li>• To learn ecological methods like dissolved oxygen in water</li></ul>              |
| <ul style="list-style-type: none"><li>• To make the student skilful in simple biochemical laboratory procedures</li></ul> |

<b>Learning outcome:</b>
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To demonstrate basic principles in ecology ,development biology etc
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<b>Zoology open course I ZO1551.2-Human Health and sex education:</b>
<b>Course objectives:</b>
<ul style="list-style-type: none"> <li>• To make the student understand the importance of good health</li> <li>• To make the student educated about clean sexual habits and thereby ward off sexually transmitted diseases</li> </ul>
<b>Learning outcome:</b>
To redress problem associated with health and sex thereby promoting fitness and well being.

<b>Zoology open course II ZO1651.2-Ornamental fresh water fish production</b>
<b>Course objectives:</b>
<ul style="list-style-type: none"> <li>• To make the student understand the scientific method of setting an aquarium</li> <li>• To make the student learn the culture and breeding techniques of common indigenous ornamental fishes .</li> </ul>
<b>Learning outcome:</b>
To make the students learn the vast potentials involve in ornamental fish farming and trading

### Zoology Complementary Course I

<b>ZO1131- Animal Diversity I</b>
<b>Aim of the Course</b>
To inculcate in the student a love and understanding of the fascinating world of invertebrates
<b>Objectives of the course</b>
□□□ Impart to the student a concrete idea of the evolution, hierarchy and classification of invertebrate phyla
□□□ Understanding the basics of systematics by learning the diagnostic and general characters of various groups
□□□ Getting an overview of typical examples in each phyla
□□□ To study the economic importance of invertebrates with the special reference to insect pests

<b>ZO1231- Animal Diversity II</b>
<b>Aim of the Course</b>
To inculcate in the student a fascination for nature and learn the bionomics of vertebrates .
<b>Objectives of the course</b>
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Learn the evolution, hierarchy and classification of different classes of chordates
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> To get an overview of the morphology and physiology of typical examples.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> To study the adaptations and economic importance of specific vertebrates.

<b>ZO1331 Functional Zoology</b>
<b>Aim of the course</b>
To familiarize students on the physiology of their own body and urge them to take precautionary measures to safeguard their health.
<b>Objectives of the course</b>
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> To study the structure and function of each system in the human body.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> To study the etiology of common physiological disorders, syndromes and diseases

<b>ZO1431-Applied Zoology</b>
<b>Aim of the course</b>
To introduce the methodology and perspectives of applied branches of zoology with a view of educating youngsters on the possibilities of self employment
<b>Objectives of the course</b>
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> To learn the basic principles involved in the culture and breeding of common edible and ornamental fishes of Kerala and the art of aquarium keeping.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> To get a basic understanding of human genomics and reproductive biology including stem cell research and prenatal diagnostic techniques

<b>ZO1432- Practical I Animal Diversity I &amp;II, Functional Zoology and Applied</b>
<b>Zoology</b>
<b>Objectives of the course</b>
· To familiarize students with conventional organ system in common, easily available animals.
· To emphasize the adage that ‘seeing is believing’ typical examples and economically important specimen (preserved) to be studied.
· To study and carry out routine clinical analysis of blood and urine

### 2.6.2 Attainment of POs and COs

The process for finding the attainment of Course outcomes and programme outcomes (POs) uses various tools/methods. Student’s knowledge and skills are measured directly from their performance in the class/assignment test, internal assessment tests, assignments, semester examinations, seminars, laboratory assignments/practicals, mini projects, Lab visits, External examination and enrolment in higher studies, placement etc. These methods provide a sampling of what students know and/or can do and provide strong evidence of student learning.