



DEPARTMENT OF ZOOLOGY
SHAILABALA WOMEN'S AUTONOMOUS COLLEGE, CUTTACK

B.Sc. Zoology (H)

Name of the Programme (No. of Years): B.Sc. (3 years)

Name of the Course: Zoology

Semester: 6 (Six)

VISION:

We envision a world in which Zoology education positively contributes to each person's ability to reach his highest potential in acting for society's good.

MISSION:

1. Prepare and equip students to be critically reflective learners and practitioners through efficient and effective processes.
2. Model and prepare students to critically evaluate sustainable practices to enhance economic, environmental, physical, social and professional needs.
3. Support the development of global citizens who understand the complexity of living in a globally interconnected world.

PROGRAMME OUTCOME:

DESCRIPTION OF PROGRAMME OUTCOMES: After completion of the Undergraduate course in Zoology the students will be able to:

PO 1: have **strong disciplinary knowledge** and develop core competency.

PO 2: have **good communication skills** to express their ideas

PO 3: have **critical thinking and problem solving ability** related to the biological aspects of living beings

PO 4: make models, diagrams, charts, graphs and conduct experiments and work in a lab with **a sense of inquisitiveness**

PO 5: Do Team work and develop leadership qualities and work for the environment/sustainability

PO 6: have **analytical and research-related skills** to generate and test hypotheses, perform experiments, surveys, projects etc.

PO 7: have **Digital literacy** and information technology skills

PO 8: have **strong moral and Ethical Awareness** regarding the use or disuse of any chemical, drug, idea, creature in day-to-day life, industry, experiments etc.

PO 9: have qualities of a **Lifelong learner** and draw inspirations from the biological phenomena

PROGRAMME SPECIFIC OUTCOMES:

- Demonstrate knowledge of basic zoological principles
- Apply one's subject knowledge and transferable skills to new/unfamiliar contexts to identify and analyse problems and issues and solve complex problems with well-defined solutions
- Practice procedural knowledge that creates different types of professionals related to Zoology area of study, including research and development, teaching and government and public service.

LEARNING OBJECTIVES:

- Demonstrate a fundamental/systematic or coherent understanding of the academic field of Zoology, its different learning areas and applications, and its linkages with related disciplinary areas/subjects
 - Use knowledge, understanding and skills required for identifying problems and issues relating to Zoology. A keen interest in research and the study of living organisms.
 - Communicate the results of studies undertaken accurately in a range of different contexts using the main concepts, constructs and techniques of the subject(s);
 - Meet one's own learning needs, drawing on a range of current research and development work and professional materials.
 - Apply one's subject knowledge and transferable skills to new/unfamiliar contexts to identify and analyse problems and issues and solve complex problems with well-defined solutions
 - Able to work precisely
 - A logical approach to problem-solving
 - Good oral and written communication abilities
- Able to work independently or with team members

MAPPING OF POs WITH CORE COURSES:

PROGRAMME OUTCOMES:	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9	CC10	CC11	CC12	CC13	CC14	GE-3	GE4	DSE-1	DSE-2	DSE-3	PROJECT WORK	
PO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

NATURE OF EVALUATION TO BE CARRIED OUT FOR THE COURSE:

Students' performance in core, discipline electives, generic electives and skill enhancement courses are to be assessed in various ways as follows:

- The oral and written scheduled and surprise tests,
- Problem-solving exercises,
- Closed-book and open-book tests,
- Practical skills and laboratory reports,
- Individual and group project reports,
- Seminar presentations,
- Group discussions
- Viva voce examinations.
- The computerized learning, literature surveys and evaluations, peers and self-assessment can be the additional methods used.
- Regular reading habits in the students need to be inculcated through continuous monitoring and observation about weaker aspect of the students.

COURSE OUTCOMES:

COURSE CODE: CORE -I

COURSE TITLE: Non-Chordates I: Protista to Pseudocoelomates

COURSE OUTCOMES:

CO 1.1: identify, classify and enlist the characteristics of the members of protists to pseudocoelomates upto class level

CO 1.2: understand and analyze the structural organization, life processes, life cycle and larval stages of the representative species of protists to pseudocoelomates

CO 1.3: create awareness and solve problems regarding pathogenicity and prophylaxis of the harmful protists to pseudocoelomates

CO 1.4: evaluate evolutionary significance of the species and methods of adaptation belonging to protists to pseudocoelomates and suggest ideas to conserve them

CO 1.5: acquire skills to make models, charts and ICT-enabled tools to prepare and deliver seminar presentations related to the topics of the course

CO 1.6: propose hypotheses, conduct experiments, handle museum specimen, perform simple project works, surveys etc. to promote conservation and management of the species for the benefit of the society

COURSE CODE: CORE -II

COURSE TITLE: Principles of Ecology

COURSE OUTCOMES:

CO 2.1 :enlist the characteristics and components of various ecosystems

CO2.2 : understand and analyze the complex inter-relationship between an individual and its environment with examples of different types of ecosystem

CO2.3 : acquire skills to represent sampling techniques, data, graphs and perform statistical analysis of the information regarding a population.

CO2.4: solve numericals based on central tendency and deviation.

CO2.5: evaluate the status of a species in its ecosystem and the strategies for its conservation and management of ecosystem and wildlife.

CO2.6: generate hypotheses and practice their testing using chi-square and t-test

COURSE CODE: CORE -III

COURSE TITLE: Non-chordates-II:Coelomates

COURSE OUTCOMES:

CO3.1: identify, classify and enlist the characteristics of coelomates upto class level

CO3.2: understand and analyze the structural organization, life processes, life cycle and larval stages of the representative species of coelomates.

CO3.3: analyse social life in bees and termites, metamerism in annelids and torsion in molluscs and the factors influencing them

CO3.4: acquire skills to make models, charts and ICT-enabled tools to prepare and deliver seminar presentations related to thrust areas of the course

CO3.5: evaluate evolutionary significance and importance of coelomates and suggest ideas to conserve and manage them

CO3.6: conduct experiments, handle museum specimen, projects, survey or research

COURSE CODE: CORE -IV

COURSE TITLE: Cell Biology

COURSE OUTCOMES:

CO 4.1: enlist the structural and functional aspects of the basic unit of life i.e. cell

CO4.2: understand the structure and functions of cell organelles involved in diverse cellular processes.

CO4.3: give examples of cell signalling and its role in cellular functions

CO4.4: analyse how cells grow, divide, survive, die and regulate these important processes

CO4.5: Have an insight into defects in functioning of cell organelles and its effects on the organism

CO4.6: conduct experiments, projects, research work in the field of cell biology

COURSE CODE: CORE -V

COURSE TITLE: Diversity and Distribution of Chordates

COURSE OUTCOMES:

- CO 5.1:** Be familiar with different classes of chordates, their habits and habitats, levels of organization and evolutionary significance
- CO 5.2:** Demonstrate the distinguishing characteristics, life processes and adaptation of chordates with suitable examples
- CO 5.3:** Find affinities of diverse chordate classes based on their body structure, function and evolution
- CO 5.4:** Analyse survival strategies like parental care in fishes and amphibia, flight adaptation in birds, biting mechanism in snakes, migration, adaptive radiation of mammals etc.
- CO 5.5:** Evaluate theories pertaining to distribution of chordates in different realms
- CO 5.6:** Handle museum specimen, give seminar presentations, go on a field trip, survey on living condition of chordates and suggest ideas to conserve them and their habitat

COURSE CODE: CORE -VI

COURSE TITLE: Physiology: Controlling And Co-Ordinating Systems

COURSE OUTCOMES:

- CO6.1: Be familiar with the physiological systems of the body, their structure, histology and functions
- CO6.2: Demonstrate the interactions of various organ systems, their control and co-ordination resulting in intricate overall functioning of human body
- CO6.3: Analyse and solve problem-based questions pertaining to human physiology to assess the status of a particular organ's functioning and its impacts
- CO6.4: Make diagrams, charts, graphs, use ICT-tools etc. to represent ideas regarding physiology, its control and co-ordination
- CO6.5: Evaluate the role of regulatory systems i.e. nervous and endocrine systems in maintaining the physiological processes
- CO6.6: Synthesize ideas to relate the concepts of physiology with real world problems including taking lifestyle decisions and maintaining perfect homeostasis

COURSE CODE: CORE -VII

COURSE TITLE: Fundamentals of Biochemistry

COURSE OUTCOMES:

- CO7.1:** Be familiar with the carbohydrates, lipids, proteins and enzymes; their chemical structure, formula and biological importance
- CO7.2:** Demonstrate the levels of organization of carbohydrates, lipids, proteins, Nucleic acids and enzymes, their chemical and physical properties.
- CO7.3:** Plot graphs of enzyme action and make structures of the biomolecules, classify them and find their importance in industries
- CO7.4:** Analyse and solve problems related to defects in the level of biomolecules and enzyme kinetics
- CO7.5:** Evaluate the role of biomolecules in biochemical processes and physiology and development.
- CO7.6:** Practice procedures and regulations in handling biomolecules in laboratory and proper disposal of the chemicals

COURSE CODE: CORE -VIII

COURSE TITLE: Comparative Anatomy of Vertebrates

COURSE OUTCOMES:

- CO 8.1:** Explain comparative account on the different vertebrate systems
- CO 8.2:** Understand the pattern of evolution and functions of body organization of vertebrates
- CO 8.3:** depict the modifications in the organ/organ system of vertebrates
- CO 8.4:** Analyse the structure and function and of vertebrate organ systems to discern their development and adaptation
- CO 8.5:** Critically evaluate the regulation of organ systems in vertebrates and find the differences
- CO 8.6:** Create models, diagrams, conduct experiments on comparative study of organs in vertebrates

COURSE CODE: CORE -IX

COURSE TITLE: Physiology: Life Sustaining Systems

COURSE OUTCOMES:

- CO 9.1:** be familiar with the Digestive, Respiratory, Excretory and Circulatory systems of humans, their structure, histology.
- CO 9.2:** demonstrate the functions of various organ systems and their regulation.
- CO 9.3:** analyse and solve problem-based questions pertaining to human physiology to assess the status of a particular organ's functioning and its impacts
- CO 9.4:** make diagrams, charts, graphs, use ICT-tools etc. to represent ideas regarding physiology, its control and co-ordination
- CO 9.5:** Evaluate the factors influencing role of digestive, respiratory, excretory and circulatory systems in human body
- CO 9.6:** Synthesize ideas to relate the concepts of physiology with real world problems including taking lifestyle decisions and maintaining perfect homeostasis

COURSE CODE: CORE -X

COURSE TITLE: Biochemistry of Metabolic Processes

COURSE OUTCOMES:

CO 10.1: Be familiar with the interactions and interdependence of biochemical processes to maintain homeostasis in metabolism

CO 10.2: Demonstrate essentials of the metabolic pathways and their regulation.

CO 10.3: Assess the role of each biochemical reaction, enzymes, intermediates etc. In the metabolic processes

CO 10.4: Calculate stoichiometry of reactions involving synthesis and degradation of biomolecules.

CO 10.5: Evaluate biological significance of the metabolic processes

CO 10.6: Perform experiments, projects involving principles of biochemistry

COURSE CODE: CORE -XI
COURSE TITLE: Molecular Biology

COURSE OUTCOMES:

- CO 11.1:** Explain the basic structure of nucleic acids, DNA, RNA and DNA replication, repair, transcription, translation, post transcriptional modifications, processing of eukaryotic RNA etc.
- CO 11.2:** Compare the mechanism of gene regulation and metabolism in prokaryotes and eukaryotes
- CO 11.3:** Elucidate the molecular machinery and mechanism of information transfer processes in prokaryotes and eukaryotes.
- CO 11.4:** Analyze the principles of gene expression and regulations
- CO 11.5:** Evaluate the role of RNAs in gene regulation
- CO 11.6:** Perform experiments like preparation of culture medium, culture of E. coli, quantitative and qualitative estimation of DNA, RNA and study gene expression from pictures

COURSE CODE: CORE -XII

COURSE TITLE: Principles of Genetics

COURSE OUTCOMES:

- CO 12.1:** Explain mendelian genetics and its extension.
- CO 12.2:** Elucidate principles of inheritance, mutation, sex-determination & extra-chromosomal inheritance with suitable examples.
- CO 12.3:** Make linkage map, calculate recombination frequency, interference, co-incidence and high order problems related to genetics.
- CO 12.4:** Analyse pedigree and present the conclusion suggesting possible causes of any defect and inheritance pattern.
- CO 12.5:** Evaluate the role of mutagens, recombination in bacteria, viruses & transposable genetic elements.
- CO 12.6:** Conduct experiments related to genetics, study human karyotype(normal and abnormal).

COURSE CODE: CORE -XIII

COURSE TITLE: Developmental Biology

COURSE OUTCOMES:

- CO 13.1:** Familiar with the events that lead to the formation of a multicellular organism from a single fertilized egg, the zygote and post-embryonic development, ageing etc.
- CO 13.2:** Elucidate the cellular and molecular processes underlying development.
- CO 13.3:** Demonstrate the general pattern and sequential developmental stages during embryogenesis
- CO 13.4:** Analyse processes of gametogenesis, fertilization, early, late and post-embryonic development.
- CO 13.5:** Evaluate the role of teratogens in developmental anomaly and importance of stem cells
- CO 13.6:** Perform experiments with placenta, developmental stages of frogs, chicks, Drosophila in the laboratory.

COURSE CODE: CORE XIV

COURSE TITLE: Evolutionary Biology

COURSE OUTCOMES:

- CO 14.1:** Be familiar with theories, evidences of evolutionary biology and extinction
- CO 14.2:** Elucidate process of evolutionary changes in a population
- CO 14.3:** Analyse the species concept and methods of speciation
- CO 14.4:** Acquire skills to predict practical implications of evolutionary forces on human population
- CO 14.5:** Use various software to generate interest towards the field of bioinformatics for molecular analysis of human origin
- CO 14.6:** Do experiments related to the field of evolutionary biology and graphically represent and interpret a data

COURSE CODE: DSE-I

COURSE TITLE: Animal Biotechnology

COURSE OUTCOMES:

- CO DSE1.1:** Be familiar with principles, molecular and culture techniques involved in animal biotechnology
- CO DSE1.2:** Elucidate the procedure that leads to genetically modified organisms.
- CO DSE1.3:** Demonstrate molecular diagnosis of genetic diseases
- CO DSE1.4:** Analyse the role of recombinant DNA technology in medicines.
- CO DSE1.5:** Evaluate the role of gene therapy, knock out techniques, etc.
- CO DSE1.6:** Perform experiments related to the field of animal biotechnology.

COURSE CODE: DSE-II
COURSE TITLE: Immunology

COURSE OUTCOMES:

- CO DSE2.1:** Be familiar with the cells and tissues of immune system and immunological diseases
- CO DSE2.2:** Differentiate innate and adaptive immunity
- CO DSE2.3:** Demonstrate the structure, function and interactions between antigens and antibodies.
- CO DSE2.4:** Analyse the role of MHC, Cytokines, Complement system.
- CO DSE2.5:** Evaluate the role of hypersensitivity and vaccines and structures involved in immunology
- CO DSE2.6:** Perform experiments related to the field of immunology.

COURSE CODE: DSE-III
COURSE TITLE: Fish and Fisheries

COURSE OUTCOMES:

- CO DSE3.1:** Familiar with systematics, morphology and physiology of fishes techniques involved in fisheries.
- CO DSE3.2:** Elucidate the structure and function of fins, scales, electric organs, gills, swim bladder, bioluminescent organs, mechanoreceptors.
- CO DSE3.3:** Demonstrate aquaculture, breeding techniques for fishes.
- CO DSE3.4:** Analyse pathological conditions in fishes.
- CO DSE3.5:** Role of transgenic fishes in research, significance of fish harvesting, byproducts and processing techniques, laws and regulations in fisheries.
- CO DSE3.6:** Do experiments and present seminar related to the field of fish and fisheries.

COURSE CODE: GE-III

COURSE TITLE: Human Physiology

COURSE OUTCOMES:

- CO GE3.1:** Be familiar with the physiological systems of the body, their structure, histology and functions
- CO GE3.2:** Demonstrate the interactions of various organ systems, their control and co-ordination resulting in intricate overall functioning of human body
- CO GE3.3:** Analyse and solve problem-based questions pertaining to human physiology to assess the status of a particular organ's functioning and its impacts
- CO GE3.4:** Make diagrams, charts, graphs, use ICT-tools etc. To represent ideas regarding physiology, its control and co-ordination
- CO GE3.5:** Evaluate the role of digestive, respiratory, renal, reproductive, endocrine and cardiovascular systems; nerves and muscle tissues.
- CO GE3.6:** Synthesize ideas to relate the concepts of physiology with real world problems including taking lifestyle decisions and maintaining perfect homeostasis.

COURSE CODE: GE-IV

COURSE TITLE: Cell and Molecular Biology

COURSE OUTCOMES:

- CO GE4.1:** Enlist the structural and functional aspects of the basic unit of life i.e. Cell
- CO GE4.2:** Understand the structure and functions of cell organelles involved in diverse cellular processes.
- CO GE4.3:** Illustrate structure of DNA, methods involved in gene expression: replication, transcription and translation etc.
- CO GE4.4:** Analyse how cells grow, divide, survive, die and regulate these important processes
- CO GE4.5:** Have an insight into the process of DNA replication, transcription and translation.
- CO GE4.6:** Conduct experiments, projects, research work in the field of cell and molecular biology

HoD

Department of Zoology

