

Department of Zoology

Govt. Autonomous College, Rourkela

Program Outcome

PO1: Students gain knowledge and skill in the fundamentals of animal sciences, understands the complex interactions among various living organisms.

PO2: Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.

PO3: Apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.

PO4: Understands the complex evolutionary processes and behaviour of animals, Correlates the physiological processes of animals and relationship of organ systems.

PO5: Understanding of environmental conservation processes and its importance, pollution control and biodiversity and protection of endangered species.

PO6: Gain knowledge of Agro based Small Scale industries like sericulture, fish farming, butterfly farming and vermi-compost preparation.

PO7: Understands about various concepts of genetics and its importance in human health.

PO8: Apply ethical principles and commit to professional ethics and responsibilities in delivering his duties.

PO9: Apply the knowledge and understanding of Zoology to one's own life and work.

PO10: Develops empathy and love towards the animals

Program Specific Outcome of Zoology

PSO-1: Learning the diversity of animal world, their habit, habitat, life history and evolution.

PSO-2: Learn to study morphology, anatomy, physiology, reproduction and development of organisms.

PSO-3: Learn heredity by study of cytology and genetics.

PSO-4: Learn about predators, parasites and pathogens, and diseases affecting animal world and find solutions for prevention.

PSO-5: Ecological knowledge with help to know the reasons of environmental degradation and help them to formulate ways for its conservation.

PSO-6: Fundamental mathematical tools like statistics, models are used to analyse complex biological situations.

PSO-7: Theoretical knowledge associated with practical skills, seminar presentations, undertaking project works will help them to acquire in depth knowledge in the field of zoology.

PSO8: Developing deeper understanding of key concepts of biology at biochemical, molecular and cellular level, physiology and reproduction at organismal level, and ecological impact on animal behaviour.

PSO9: Elucidation of animal-animal, animal-plant, animal-microbe interactions and their consequences to animals, humans and the environment.

PSO10: Strengthening of genetics and cytogenetics principle in light of advancements in understanding human genome and genomes of other model organisms.

PSO11: Description of expression of genome revealing multiple levels of regulation and strategies to manipulate the same in the benefit of the mankind.

PSO12: Learning handling DNA sequence data and its analysis which equip students to get employed in R&D in the industry involved in DNA sequencing services diagnostics, and microbiome analysis.

PSO13: Maintenance of high standards of learning in animal sciences.

COURSE OUTCOME (B.Sc. Zoology)

Semester I:

Core 1: Non-Chordates- Understand and classify the name of animals on the basis of nomenclature rules of Phylum Protista to Pseudocoelomates.

Core 2: Principles of Ecology- Understand habitat ecology, biodiversity, biometry and importance of natural resources and their conservation.

Semester II:

Core 3: Non-Chordates- Understand and classify the names of animals on the basis of nomenclature rules of Phylum Annelida to Echinodermata.

Core 4: Cell Biology- Gain knowledge of different types of cells and their characteristics, cell division, cell differentiation and cell signalling.

Semester III:

Core 5: Diversity and distribution of Chordates- Understand and classify the general characteristics of animals and their origin from Protochordata, Chordata, Pisces, Amphibia, Reptiles, Aves and Mammals.

Core 6: Physiology: Controlling and Coordination Systems- Understand the physiology of mammals, Nervous system, Reproductive system and Endocrine system and its secretion.

Semester IV:

Core 7: Fundamentals of Biochemistry and microbiology- Gain knowledge about structure and functions of carbohydrates, lipids, proteins and enzymes. Understand the classification structure and reproduction of bacteria and viruses.

Core 8: Comparative Anatomy of Vertebrates- Gain knowledge about integumentary system, skeletal system, digestive system, respiratory system, circulatory system, urinogenital system, nervous system and sense organ of Phylum Vertebrates.

Semester V:

Core 9: Physiology: Life sustaining system- Understand physiology and function of digestion, respiration, excretion and circulatory system.

Core 10: Biochemistry of Metabolic Processes- Understand the overview mechanism of metabolism processes such as carbohydrate metabolism, lipid metabolism, protein metabolism and oxidative phosphorylation.

Semester VI:

Core 11: Molecular Biology- Gain knowledge about salient features and mechanism of nucleic acids, DNA replication, transcription, translation, post transcriptional modification and processing of eukaryotic RNA, gene regulation & regulatory RNAs.

Core 12: Principles of Genetics- Understand Mendelian genetics, linkage, crossing over, chromosomal mapping, mutations, sex determination, extra chromosomal inheritance recombination in bacteria and viruses & transposable genetic elements.

COURSE OUTCOME (M.Sc. Zoology)

Semester I:

Paper 101: Microbiology- Gain knowledge about classification, history and development of microbes, microbial growths, role of microbes in agriculture and industry. General features and classification of bacteria, virus. Types and mode of action and pathogenicity of microbial toxins, bacterial toxins, fungal toxins, alternaria algal toxins and chemotherapeutic

Paper 102: Genetics- Comprehensive and detailed understanding of genetic methodology and how quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms. The knowledge required to design, execute, and analyse the results of genetic experimentation in animal and plant model systems.

Paper 103: Biochemistry- Understand biochemistry at the atomic level, detail about amino acid structures, types of amino acids, classifications, structure of proteins and types of proteins, relationship between the properties of macromolecules and cellular activities, cell metabolism and chemical composition.

Paper 104: Animal Diversity & Animal Behaviour- Provides students with an in-depth knowledge of the diversity in form, structure and habits of invertebrates. Learn basics of systematics and understand hierarchy of different categories. Acquire knowledge of key concepts and principles and overarching themes in animal behaviour, animal cognition, conservation psychology/biology, animal welfare science, comparative psychology and research methods.

Paper 105: Practical- Gain knowledge to identify various animals based on morphological features. List the various invertebrate and vertebrate animals in a given class. Identify various larval stages and development in invertebrate and vertebrate groups.

Semester II:

Paper 201: Physiology & Endocrinology- Explain the basic knowledge of human anatomy and physiology. Defines anatomy & physiology. Compares living and lifeless organisms. Define the main structures composing human body. Explains structure and functions of cell. Identify the contributions of the endocrine system to homeostasis.

Paper 202: Cell Biology- Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles. Explain the role of compartmentalization and signalling in cellular biology. Evaluate and apply knowledge of modern techniques in cellular biology.

Paper 203: Molecular Biology- Understanding of chemical and molecular processes that occur in and between cells. Able to describe and explain processes and their meaning for the characteristics of living organisms. To make the student to understand the concept of cell and their activities and molecular signalling.

Paper 204: Instrumentation & Analytical Techniques- Explain the theoretical aspects of key analytical techniques and instruments used in geochemistry, including but not limited to electron microscopy, X-ray diffraction, mass spectrometry and spectroscopy. Strategically

plan analytical campaigns to apply to different types of samples and research objectives, including selection of the most appropriate technique/instrumentation for the students' research project.

Paper 205: Practical-

Understand the basic principle involved in isolation of biomolecules from various biological sources. Isolate DNA from various sources – i.e. plant, microbes and animals. Purify DNA, RNA & separate DNA, RNA Separating Proteins by SDS PAGE. Understanding the mobility differences of macromolecules in electrophoresis. Understand the optimal conditions essential for protein/nucleic acid separation and purification

Semester III:

Paper 301: Ecology-Define the ecology of individual, population, community and ecosystem. Define the concepts that are the ambient, environment, biome, biosphere, ecosphere, ecological relationship and factors, and homeostasis. Define big ecosystems such as territorial ecosystems, freshwater ecosystems, ocean ecosystems, wetlands ecosystems and its importance.

Paper 302: Immunology & Cancer Biology-Understand the fundamental concepts of immunity, contributions of the organs and cells in immune responses. Realize how the MHC molecules function and host encounters an immune insult. Understand the antibodies and complement system. Understand the mechanisms involved in initiation of specific immune responses. Differentiate the humoral and cell mediated immune mechanisms.

Paper 303: Developmental Biology & Animal Biotechnology-Discuss basic embryonic development. Evaluate the applications of cell and development biology to understand the basic of life Be able to describe the stages and cellular mechanisms (ingression, invagination, convergent extension) of gastrulation in the sea urchin. Be able to describe the functions of gastrulation. Illustrate the techniques, procedure and growth patterns of animal cell culture.

Paper 304: Taxonomy, Biosystematics & Paleozoology- Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology. Analyse the relationships among animals. Understand the patterns and processes of evolution above the species level. Better understand the principles of extinction, evolutionary change, and biodiversity.

Paper 305: Practical-Learn about Antigen –Antibody interaction and Blood Grouping. Knowledge about preparation of Blood smear for differential count. Know about lymphoid organs. Study about different types of estimation of different particulars of water samples.

Semester IV:

Paper 401: Chemical Foundations, Protein Chemistry & Enzyme Technology-Distinguish the fundamentals of enzyme properties, nomenclatures, characteristics and mechanisms Apply biochemical calculation for enzyme kinetics Compare methods for production, purification, characterization and immobilization of enzymes. Draw conclusions about protein dynamics, structure and function from detailed chemical and physical properties.

Paper 402: Regulation of intermediary metabolism-Define the major pathways of intermediary metabolism of biomolecules, and discuss their bioenergetics, physiological adaptation, metabolic and main hormonal regulation, localization and cellular compartmentalization. Correlate the metabolic activity of tissues and organs with their function.

Paper 403:Genomics-This course aims to provide the knowledge and practical skills of functional genomics. The course also teaches the techniques used in functional genomics such as microarrays, NGST, mRNA expression and miRNA expression. By the end of the course, students will have the necessary learning to radically advance our understanding of life and transform medicine.

Paper 404: Cell Signalling, Apoptosis & Cancer- Define signal transduction mechanisms by cell surface receptors. Define signal transduction pathways of cytoplasmic second messenger. Explain signalling pathways that control cell proliferations. Define signal transduction by nuclear receptors and steroid hormones

Paper 405: Project/Practical-Understand project characteristics and various stages of a project. Use effectively oral, written and visual communication. Identify, analyse, and solve problems creatively through sustained critical investigation. Integrate information from multiple sources.