GOVT. DR. INDRAJEET SINGH COLLEGE, AKALTARA DISTT. JANJGIR-CHAMPA (C.G.)

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College Code- 3003

PROGRAMME OUTCOMES, PROGRAMME SPECIFIC OUTCOMES AND COURSE OUTCOMES

DEPARTMENT OF ZOOLOGY

PROGRAM- BSc., ZOOLOGY

PROGRAM OUTCOME

1. Knowledge and understanding about the animal diversity.
2. Practical skill in the field and laboratory experiments.
3. Presentation skills (oral & writing) in life sciences.
4. Scientific knowledge in life science and fundamental metabolism of animals.
5. Knowledge about the biodiversity exploration, estimation and conservation.

PROGRAM SPECIFIC OUTCOME

After successfully completing **M. Sc. Zoology** Programme students will be able to:

1. **PSO1.** Ability to connect and apply biological knowledge to other disciplines and to integrate knowledge into their personal and professional lives.

2. **PSO2**. Explain the origin of life with context to the origin of eukaryotic cell and endosymbiotic theory of origin., fossil records, Darwinism and Neo-Darwinism, experimental evidences. And evolution of horse.

3. **PSO3.** Illustrate zoological science for its application in branches like medical entomology, apiculture, aquaculture and agriculture etc

4. **PSO4.** Understand animal interactions with the environment and identify the major groups of organisms with an emphasis on animals and classify them within a phylogenetic framework.

COURSE OUTCOME

SN	NAME OF COURSE	YEAR/ SEMESTER	NAME OF SUBJECT	COURSE OUTCOME
1	BSc.	PART-1	Cell Biology	1. On completion of the course, students are able to: 2. Understand the Scope of cell biology, because cell is the basic unit of life. 3. Understand the Main distinguishing characters between plant cell and animal cell. 4. To study and understand the whole cell organelles with their structure and function. 5. Understand the cell cycle and know the importance of various cells in body of organisms. 6. Understand the various applications of cells by using cell biology like study of various types of tumour.
2	BSc.	Part-1	Non-Chordates	1. Understand about the Non-Chordate animals. 2. To study the external as well as internal characters of non-chordates. 3. To study the distinguishing characters of non-chordates. 4. Understand the economical importance of Molluscs. 5. Understand the Characters of class Asterias with help of animal Sea star. 6. Understand the internal as well as external morphology of that animal. 7. To study and understand the concepts-Metamorphosis, regeneration and autotomy. 8. Understand the Mouthparts of insects. 9. Understand the Canal system in sponges. 10. Understand the Locomotion in Protozoa. 11. To observe and study the Foot in Mollusca.
3	BSc.	Part-1	Chordate	1. Understand the phylum Chordate. 2. Understand the evolution, history of phylum 3. Understand the evolution, history of phylum. 4. Understand the basic concepts about chordates. 5. Understand the external morphology and sexual dimorphism in chordates. 6. Study and understand the various systems, adaptation and dentition in Mammals.
4	BSc.	Part-1	General Embryology	1. Identify the developmental stages 2. Describe the key events in early and systematic embryological development. 3. Describe the process of gametogenesis.

				4. Describe the chick development up to 96 hours of incubation and extra embryonic membranes. 5. Explain the theories of preformation, and concepts like growth, differentiation and reproduction. 6. Explain the principles and process of fertilization and cleavage. 7. Prepare the flow chart of gametogenesis process.
5	BSc.	Part-1	Practical Paper	1. Identify the life cycle stages of few parasites. 2. Identify and explain the cleavage blastulae and grastrulae 3. Identify the age of chick embryo. 4. Identify the phases of cell division. 5. List the household Pest and social insects. 6. Explain the pathogenicity and morphology of few ectoparasites. 7. Explain the diseases spread by vectors. 8. Explain the interrelationship of insects and human with examples. 9. Explain the effects of household insects on human health. 10. Demonstrate rectal parasites in cockroach. 11. Demonstrate Mitochondria/ mitotic and meiotic stages by stained preparations. 12. Illustrate the social organization in insects. 13. Prepare temporary slide of chick embryo to identify the stage and age. 14. Prepare mounting of mouth parts of few common insects
6	BSc.	Part-2	Structure and Function of Vertebrates	1. Understand the classes of vertebrates: fishes, Amphibia, Reptilia, Aves and Mammals. 2. Study of endoskeleton of vertebrates. 3. Comparative Study of skin of vertebrates. 4. Understand the comparative account of urogenital system, nervous system, digestive system heart and aortic arches and its evolution in vertebrates. 5. Understand the physiology of nerve impulse and 3ignaling mechanism and digestion.
7	BSc.	Part-2	Vertebrate endocrinology and reproductive biology	1. define endocrine grands and hormone. 2. Understand the general idea about hormone roles in animal body. 3. Understand the types of hormone, synthesis, secretion and its function. 4. Understand the mechanism of hormone action and its termination.

				5. Understand the reproductive system of animal and its function. 6. Understand the role of hormone in animal reproduction and reproductive cycle. 7. Understand the disease and disorder of imbalance of hormones. 8. Reproductive 4ehavior in animal like courtship pattern.
8	BSc.	Part-2	Ethology	1. Define the term ethology/animal behaviour. 2. Understand the reproductive behaviour in animals. 3. Understand about orientation behaviour in animal, like taxis, reflexes. 4. Understand about drugs, hormones and behavior.
9	BSc.	Part-2	Organic Evolution	1. Define organic evolution. 2. Explain the theories of organic evolution. 3. Describe the concept of origin of life and theories of origin of life. 4. Describe evolution of horse . 5. Illustrate the presence of organisms at various geological time scale. 6. Apply the knowledge in relevant experimentations. 7. Categorize different zoogeographical realms. 8. Compare animal distribution in different zoogeographical realms.
10	BSc.	Part-2	Applied Zoology	1. Introduce the term apiculture to the students. 2. To aware the students and provides the economical importance of Apiculture. 3. Understand the Bee keeping equipments and apiary management. 4. To study and understand the various species of Bees.
11	BSc.	Part-2	Practical Paper	1. Identify the organs by studying the histological slides. 2. Identify hormonal disorders using pictures. 3. Explain the anatomical features of brain, heart, kidney and skin of vertebrates. 4. Explain the anatomical features of brain, heart, kidney and skin of vertebrates. 5. : Identify the fossil types/ adaptations in animals. 6. Explain the evidences of evolution 7. Identify the age of chick embryo. 8. Illustrate the social organization in insects.
12	BSc.	Part-3	Environmenta l Biology &	1. List the environmental challenges and their remedies.

			Toxicology	2. Describe the nature of ecosystem, productivity, food webs, energy flow, 3. Describe the resilience of ecosystem and ecosystem management. 4. Explain Biosphere, biomes and impact of climate on biomes. 5. Explain wildlife management in India and conservation of wildlife. 6. Explain the three necessary and sufficient conditions i.e. struggle for existence; variation; and inheritance. 7. Illustrate the toxic effects of chemicals in the environment on human and his 8. livestock. 9. Discuss natural resources, causes of their depletion and their conservation.
13	BSc.	Part-3	Microbiology	1. Understand about general and applied microbiology. 2. Uses of microbes to making for useful product in industries. 3. Microbiology of domestic water and sewage.
14	BSc.	Part-3	Medical microbiology	1. Define the basic terms in parasitology. 2. List common ectoparasites and endoparasites. 3. Explain animal associations and their types. 4. Discuss the life cycle and importance of major parasites. 5. Illustrate transmission routes of animal and zoonotic parasites 6. Classify parasites. 7. Justify the control measures of arthropod vectors. 8. Convince the importance of hygiene with respect to epidemic diseases.
15	BSc.	Part-3	Genetics & Molecular biology	1. Define the basic terms in genetics. 2. Discuss the linkage groups and gene frequency. 3. Explain the concept of mutation. 4. Paraphrase the Central dogma of molecular biology. 5. Illustrate the mechanism of replication, transcription and translation.
16	BSc.	Part-3	Biological Chemistry	1. Define the basic terms in biochemistry. 2. Explain the structure, functions and reactions of the various biomolecules. 3. Give examples of each group type of biomolecules. 4. Correlate the changes in the levels of these biomolecules with the diseases in human

				5. Calculate pH and pOH of buffer solution. 6. Classify the biomolecules. And enzyme. 7. Draw the structures of major biomolecules.
17	BSc.	Part-3	Biological techniques	1. Describe the techniques used in hematology. 2. Explain the principle of separation techniques. 3. Illustrate the working of microscopes. 4. List the separation techniques. 5. Demonstrate the principle, working, applications of centrifugation.
18	BSc.	Part-3	Practical Paper	1. Count total leucocytes from blood samples. 2. Estimate the Hb. level in blood samples. 3. Measure the pH of given samples. 4. Identify the life cycle stages of few parasites. 5. Explain the pathogenicity and morphology of few ectoparasites. 6. Explain the importance and applications of techniques in biochemistry.

PROGRAM- MSC., ZOOLOGY

PROGRAM OUTCOME

1. Knowledge and understanding about the animal diversity.
2. Practical skill in the field and laboratory experiments.
3. Presentation skills (oral & writing) in life sciences.
4. Scientific knowledge in life science and fundamental metabolism of animals.
5. Knowledge about the biodiversity exploration, estimation and conservation.

PROGRAM SPECIFIC OUTCOME

1. **PSO1.** Explain how organisms function at the level of the gene, genome, cell,

tissue, organ and organ-system and develop theoretical and practical knowledge in handling the animals and using them as model organism

2. **PSO2**. Illustrate physiological adaptations, development, reproduction and

behaviour of different forms of life.

3. **PSO3.** Illustrate zoological science for its application in branches like medical entomology, apiculture, aquaculture and etc.

4. **PSO4.** Develop proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization and relate concepts of comparative biology to explain evolution and success to live in varied environment

5. PSO5. To know the detail knowledge about fish and fisheries. The structure and function, adaptation, reproduction, development, special organs like luminous, poison organs of different types of fishes.

COURSE OUTCOME

SN	NAME OF COURSE	YEAR/ SEMESTER	NAME OF SUBJECT	COURSE OUTCOME
1	MSc.	I Sem.	Non-chordate	1) Understand about the Non-Chordate animals. 2) To study the external as well as internal characters of non-chordates. 3) To study the distinguishing characters of non-chordates. 4) Understand the economical importance of Molluscs. 5) Understand the Characters of class Asterias with help of animal Sea star. 6) Understand the internal as well as external morphology of that animal. 7) To study and understand the concepts- Metamorphosis, regeneration and autotomy. 8) Understand the Mouthparts of insects. 9) Understand the Canal system in sponges. 10) Understand the Locomotion in Protozoa. 11) To observe and study the Foot in Mollusca.
2	MSc.	I Sem.	Animal behaviour	1) Define the term ethology/animal behaviour. 2) Understand the reproductive behaviour in animals.

				3) Understand about orientation behaviour in animal, like taxis, reflexes. 4) Understand about drugs, hormones and behaviour.
3	MSc.	I Sem.	Biostatistics	**1.** Explain the application of sampling in biological sciences**.** 2. Explain standard Probability distributions. 3. Understand the Applications and uses of Statistics. 4. Understand the Data Classification: Frequency, Relative frequency, class limits, class 5. width, inclusive and exclusive method of classification. 6. Understand the mean, mode and median. 7. Understand the Computation of Variation. 8. Understand the Correlation and Regression. 9. Understand the testing of hypothesis. 10. Understand the Statistical hypothesis, Null Hypothesis, Alternative hypothesis etc. 11. Understand the t-test, F-test. 12. Understand the analysis of variance, meaning of ANOVA. One way and two way classification. 13. Explain the concept and types of central tendency. 14. Explain the concept of correlation and regression with their properties. 15. Classify the given data. 16. Graphically represent the given data. 17. Illustrate the measures of dispersion with examples. 18. Solve statistical problems.
4	MSc.	I Sem.	Environmental Biology & Toxicology	1. List the environmental challenges and their remedies. 2. Describe the nature of ecosystem, productivity, food webs, energy flow, 3. Describe the resilience of ecosystem and ecosystem management. 4. Explain Biosphere, biomes and impact of climate on biomes. 5. Explain wildlife management in India and conservation of wildlife. 6. Explain the three necessary and sufficient conditions i.e. struggle for existence; variation; and inheritance. 7. Illustrate the toxic effects of chemicals in the

				environment on human and his livestock. 8. Discuss natural resources, causes of their depletion and their conservation.
5	MSc.	I Sem.	Practical	1) Identify the adaptations in animal. 2) Demonstrate physical and chemical properties of water and soil samples. 3) Explain the interrelationship of insects and human with examples. 4) Explain the effects of household insects on human health. 5) Demonstrate rectal parasites in cockroach. 6) Understand the various internal systems like Digestive system, nervous system with the help of charts. 7) Understand the functions of Gemmules and spicules. 8) Understand the economical importance of Molluscan shells. 9) To study and understand the classification of whole phyla includes in Non chordates 10) with the help of charts/models/pictures. 11) Understand the evolutionary history of Non chordates.
6	MSc.	II Sem.	Endocrinology and reproductive physiology	1. Discuss the roles of Pituitary gland and pineal body. 2. Explain hormonal regulation of biomolecules and mineral metabolism. 3. Describe the role of osmoregulatory and gastrointestinal hormones. 4. Explain the role of hormones in moulting, change in body colour of crustaceans; yolk synthesis in amphibians; insect development. 5. Illustrate the mechanism of hormone action and role of hormone receptors. 6. Justify hormones as coordination molecules 7. Sex determination in animals 8. Reproductive cycle and maturity in human being 9. Compare and contrast spermatogenesis and oogenesis. 10. Illustrate the histology of endocrine glands.
7	MSc.	II Sem.	Cell and Molecular Biology	1. Explain the DNA structure & types, topology, Physical properties; chromatin structure and organization. 2. Discuss genome organization. 3. explain the mobile DNA elements.

				4. Explain mechanism of DNA damage and repair. 5. Illustrate the process of DNA replication, transcription, translation and their regulations. 6. Schematically represent the processes of central dogma. 7. Justify the post translational and post transcriptional modifications. 8. Aware the students for Cancer. 9. Understand the Aging, Apoptosis
8	MSc.	II Sem.	Tools and techniques	1. Explain the importance and applications of techniques in biochemistry. 2. Explain the principle and applications of various chromatographic techniques with examples. 3. Explain the principle, working, materials used and applications of electrophoresis 4. Demonstrate the principle, working, applications of centrifugation. 5. Understand about cryopreservation, and cell culture. 6. Understand about media for cell and tissue culture method
9	MSc.	II Sem.	Practical	1. Understand the Animal cells and various cell organelles by using microphotographs. 2. Understand the concept vital staining , distinguishing points between nuclear stain and cytoplasmic stain. 3. Understand the techniques using for the study of blood corpuscles. 4. Understand the meaning of Osmotic pressure, isotonic, hypotonic, hypertonic. 5. explain the principle of Colorimetry and Spectrophotometry. 6. Use the basic equipment in biochemistry lab.
10	MSc.	III Sem.	Vertebrate structure and function	1. Understand the terms Histology and Physiology 2. Understand the cell, tissue, organ, system and organisms. 3. Study the derivatives of skin- horns, nails, hairs. 4. Understand the General Topics like Accessory respiratory organs in fishes. 5. Understand and study the various systems like Digestive systems 6. To study and understand the Scales, Fins,

				Arial adaptation and Dental formula. 7. Understand the Classification various classes of phylum Chordate i.e.Pisces, Reptiles, 8. Aves and Mammals.
11	MSc.	III Sem.	Biosystematics and biodiversity	1. State the outline of chordate classification. 2. Classify the higher vertebrate groups. 3. Categorize the diversity found in the vertebrate groups of animals like reptiles,birds and mammals. 4. To know the Biodiversity. 5. Understand the principles and methods of taxonomy.
12	MSc.	III Sem.	Immunology and developmental biology	1. List the primary and secondary immune organs. 2. Explain the concepts of immunity, self-nonself immune response, autoimmune disease. 3. Explain the theories of antibody synthesis and generation of antibody diversity. 4. Illustrate the events and dynamics of inflammation 5. Compare the MHC molecules and diseases associated with HLA. 6. Differentiate between active and passive immunization. 7. Compare the three pathways of complement fixation pathway. 8. Define the terms in developmental biology 9. Explain model organism for developmental studies. 10. Explain the concept of fertilization. 11. Explain the concept of mesoderm induction and pattern formation with examples. 12. Explain the concept of growth and differentiation. 13. Illustrate the types of eggs and cleavage pattern.
13	MSc.	III Sem.	Population Genetics and evolution	1. To know about evolutionary forces. 2. Can construct a phylogenetic tree. 3. To know about inbreeding. 4. Explain the principles of Population genetics. 5. Illustrate the modified Mendelian laws of inheritance. 6. Justify the inheritance of qualitative and quantitative traits. 7. Solve the problems based on gene frequency. 8. Solve the problems based on Hardy-Weinberg

				law.
14	MSc.	III Sem.	Practical	1. Identify the pattern of identity of antigen-antibody reaction. 2. Identify the microscopic structure of the lymphoid organs. 3. Demonstrate immunoelectrophoresis technique. 4. Detect the human blood groups by antigen - antibody reactions. 5. Understand the classification of Pisces, and tetrapodes . 6. Understand the classification of Amphibia, Reptilia , Aves, Mammals. 7. Understand the Axial skeleton of mammal. 8. Understand the urinogenital system of vertebrates. 9. Understand the cell culture techniques and separation techniques in biology. 10. Understand the function of Biosensors. 11. Understand the locomotory and respiratory adaptations in amphibians and reptiles. 12. Explain the principle and application of the common techniques used in Immunology.
15	MSc.	IV Sem.	Neurophysiology Physiology and general physiology	1. Demonstrate the effect of body size and salinity on oxygen consumption in given animal. 2. Understand the nervous system its part and structure with significant function. 3. Understand the synapse , receptor , nerve ending, and synaptic transmission. 4. EEG and ECG. 5. Demonstrate the effect of starvation on liver and muscle glycogen in given animal. 6. Detect the normal and abnormal constituents in human urine. 7. Find the absorption spectra of blood pigment. 8. Estimate serum uric acid from given sample.
16	MSc.	IV Sem.	Biochemistry	1. Define basic terms in biochemistry. 2. Explain the chemistry of life. 3. Explain the structure and functions of various biomolecules. 4. Explain the importance of vitamins and coenzymes and disorders related to them. 5. Illustrate the importance of pH, buffer and water in living systems. 6. Draw the structures of various carbohydrates and amino acids.

				7. Classify enzymes with examples. 8. Define basic terminologies of metabolic pathways. 9. Explain the laws of thermodynamics, concept of free energy and ATP as currency molecule. 10. Describe the Concepts and regulation of metabolism. 11. Discuss the oxidation of fatty acids and its significance. 12. Illustrate the electron transport chain and oxidative phosphorylation. 13. Illustrate the reactions, energetics and regulation of glycolysis, glycogen biosynthesis, 14. TCA cycle, Purine and Pyrimidine metabolism 15. Write the general reactions of various metabolic pathways. 16. Justify the role of enzymes in metabolism
17	MSc.	IV Sem.	Ichthyology (specialization)	1. Know all about fishes and there general as well as special characters. 2. Understand the classification of fishes 3. Understand the adaptation in stress condition. 4. Structure and function of fishes special organs 5. Understand the reproduction and growth of fishes 6. Understand the behaviour of fishes 7. Understand the distribution fishes in the world . 8. To know the indigenous and exogenous fishes. 9. Understand the diseases of fishes due to different parasites.
18	MSc.	IV Sem.	Practical	1. Identify the organs by studying the histological slides. 2. Demonstrate the structure of tissues by making temporary slides. 3. Use techniques like chromatography, 4. Prepare blood smear and identify the various cells. 5. Process animal tissues and prepare permanent histological slides. 6. Count total leucocytes from blood samples. 7. Estimate the Hb.level in blood samples. 8. Identify commercially important freshwater fish. 9. Separate biomolecules by chromatographic methods.