

PROGRAMME OBJECTIVES & COURSE OUTCOMES

SUBJECT – ZOOLOGY

(As per Model CBCS Syllabus)

CORE COURSE – I

NON-CHORDATES-1

PROTISTA TO PSEUDOCOELOMATES

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Learning objectives of Core Course –I include the following:

1. Idea about the general character and classification of different phyla of invertebrates including Protista, Parazoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematelminthes.
2. To provide basic knowledge about the life cycle, pathogenicity and prophylaxis of different organisms like *P. vivax*, *Entamoeba histolytica*, *Fasciola hepatica*, *Taenia solium* etc.
3. Sensitizing the students regarding parasitic adaptation among animals and to impart knowledge about the evolution of parazoa and metazoa.
4. Knowledge about animals belonging to phylum Protozoa, Porifera, Cnidaria, Ctenophora and Nematelminthes in practical classes.

OUTCOME:

Studying in detail about the above students will be knowledgeable about the following things:

1. Students will learn about the general character and classification of different phyla of invertebrates.
2. The students will gain awareness regarding the life cycle, pathogenicity and prophylaxis of different organisms.
3. Proper information about parasitic adaptation among animals with evolution of parazoa and metazoa.

4. Practical experiments will make the students aware about Protozoa, Porifera, Cnidaria, Ctenophora and Nematelminthes.

CORE COURSE – II
PRINCIPLES OF ECOLOGY
(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Teaching learning process of the theory and Practical subject bear the following objectives:

1. Introduction to the study of ecology and its importance in today's life.
2. To make the students aquatinted with the terms and usefulness of population, Community and Ecosystem interactions and development.
3. Making the students expert to analyze various aspects of ecosystem and ecological efficiencies.
4. Educating about strategies of biodiversity conservation.
5. Improving experimental efficiency to perform the study of life tables and plotting of survivorship and determination of BOD, COD, Free CO₂, Hardness of water, TDS etc.

OUTCOME:

After understanding the above subject the students will get knowledge about the following things:

1. Students will know the relevance of ecology and its study.
2. Gaining knowledge about population, Community and their dynamics.
3. Making the students able to analyze the ecosystem and ecological efficiencies.
4. They would have to understand the conservation of biodiversity and conservation strategies.
5. Improving the efficiency to perform practical on study of life tables and plotting of survivorship and determination of BOD, COD, Free CO₂, Hardness of water, TDS etc.

CORE COURSE-III
NON-CHORDATES-II: COELOMATES
(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

This paper will enable the students regarding the following:

1. To impart quality education about the general character and classification of different phyla of invertebrates including Coelomates, Annelids, Arthropods, Onychophores, Molluscs and Echinoderms.
2. It will educate the students regarding evolution of coelom, metamerism and physiology of excretion in Annelids.
3. It will help the students in improving their knowledge about social life of Bees and Termites.
4. To learn about vision, respiration in Arthropoda and metamorphosis in insects.
5. It will help the students to know about the evolutionary significance of Trochophore larva.
6. Improving knowledge about the water vascular system and evolutionary significance of larval forms in Echinodermata.
7. Experimental knowledge about study of animals of different phyla like annelida, arthropoda, mollusca and Echinodermata.

OUTCOME:

Completion of the topics in Core Course III students shall be educated regarding:

1. Understanding the general characters and classification of phyla like arthropoda, Mollusca, Echinodermata etc.
2. Knowledge about evolution of colome, metamorphosis of insects.
3. Knowledge about the vision and respiration in Arthropoda.
4. Torsion and detorsion in Gastropoda.
5. Evolutionary significance of Trochophore larva.
6. Water vascular system and larval forms in Echinodermata.
7. Affinities of echinoderms with chordates.

CORE COURSE- IV
CELL BIOLOGY
(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Acquiring sufficient knowledge about the following:

1. Prokaryotic and Eukaryotic cells, viruses, bacteria etc.
2. An overview of cells and plasma membrane.
3. Transport across membranes and modes of transportation across cell membranes.
4. Structure and functions of cytoskeleton, Golgi and Lysosome and Mitochondria.
5. Mitochondrial respiratory chain and chemi-osmotic hypothesis.
6. Nucleus, its structure and role in different types of cell division, cell cycle and its regulation.
7. Practical courses will make the students more informative about preparation of temporary stains of squash of onion root-tip.
8. Study of various stages of mitosis and meiosis.
9. Preparation of permanent slides to demonstrate DNA by Fuelgen reaction, DNA and RNA by MGP etc.
10. Demonstration of osmosis etc.

OUTCOME:

1. Proper knowledge about cell, cell inclusions and cell cycle.
2. Role of cell division in various physiological activities.
3. Biochemical function of mitochondria in cellular respiration.
4. Practical knowledge about temporary and permanent slides, staining techniques.

CORE COURSE-V
DIVERSITY AND DISTRIBUTION OF CHORDATES
(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Completion of the topics included in this course students will be informed about the following:

1. To impart detailed knowledge about the general characters and classification of different phyla of chordates.

2. Knowledge about the retrogressive metamorphosis in urochordata, structural peculiarities and affinities of cyclostomata.
3. It helps the students to know about migration and osmoregulation in fishes, parental care in fishes and amphibians.
4. Evolutionary significance of Dipnoi and knowledge about origin of tetrapoda and evolutionary significance of Archaeopteryx.
5. To provide basic knowledge about affinities of sphenodon, biting mechanism in snakes, flight adaption and migration in birds.
6. To provide knowledge about Adaptive radiation with reference to locomotory appendages in mammals.
7. In practical classes students shall be taught about museum specimen of different phyla of chordate and they will also know about sections of protochordates.
8. Power point presentation on study of animals.

OUTCOME:

On completion of the above course the students will be able to:

1. Understand about the general character and classification of different phyla and classes of chordates.
2. Get a proper knowledge about the retrogressive metamorphosis in urochordata, structural peculiarities and affinities of cyclostomata.
3. Understand about migration and osmoregulation in fishes, parental care in fishes and Amphibians.
4. Learn about biting mechanism in snakes, flight adaption and migration in birds.
5. Analyze the adaptive radiation with reference to locomotor appendages.
6. Analyze about different museum specimen of different phyla of chordate and they also will know about sections of protochordates.
7. Evolutionary significance of distribution of animals.

CORE COURSE-VI

Physiology – Controlling and Coordinating System

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

To make the students informed about the physiological aspects in animals by the following:

1. Basic structure of tissues and tissue system.
2. Structure, location, classification and functions of different types of tissues.
3. Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction.
4. To educate them to understand structure and function of nervous system. Synaptic transmission, reflex action etc.
5. Physiology of male and female reproduction, Methods of contraception in male and female etc.
6. Histology of endocrine glands and regulation of their secretion.
7. Practical performance with the experiments to demonstrate the reflex action.
8. Preparation of temporary and permanent mounting with the skills of microtomy.

OUTCOME:

After completion of the above topics, students will get knowledge about the following aspects:

1. Basic structure of tissues and their contribution to normal function.
2. Knowledge about the structure and function of neuron, synaptic transmission and physiology of hearing and vision.
3. Knowledge of different type of muscles, molecular and chemical basis of muscle contraction.
4. Structure and function of endocrine glands and hormones secreted by them and their mechanism of action.
5. Practical knowledge of reflex action and preparation of mounting with the skills of microtomy.

CORE COURSE-VII

FUNDAMENTALS OF BIOCHEMISTRY AND MICROBIOLOGY

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Teaching and learning objective of this course includes the following:

1. Structure and Biological importance of Carbohydrates and Lipids.
2. Structure, Classification and General properties of amino acids.
3. Physiological importance of essential and non-essential amino acids.
4. Levels of organization in proteins; Renaturation and, Denaturation.
5. Immunoglobulins: Basic Structure, Classes and Function, Antigenic Determinants
6. Nomenclature and classification of enzymes, Specificity of enzyme action, Mechanism of enzyme action and Enzyme kinetics with Regulation of enzyme action.
7. Classification, structure and reproduction of Bacteria.
8. Microbes of food, agriculture and industry.
9. Pathogenic Bacteria and virus and their pathogenicity.
10. Practical aspects on qualitative tests of functional groups in carbohydrates, proteins and lipids.
11. Practical knowledge of Paper chromatography of amino acids and demonstration of protein separation.
12. Identification of different bacteria and viruses.

OUTCOME:

1. Detailed knowledge about different bio-molecules, their basic structure, function etc.
2. Levels of organization of these biomolecules and their role in living systems.
3. Immunity and immune system.
4. Enzymes: structure, classification and function in different animal systems.
5. Pathogens: their effects and control measures.
6. Qualitative tests of Carbohydrates, lipids and proteins: practical experience.
7. Process and uses of Paper chromatography.

CORECOURSE-VIII

COMPARATIVE ANATOMY OF VERTEBRATES

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

To impart sufficient knowledge about:

1. Structure, functions and derivatives of integument.
2. Axial and appendicular skeleton.
3. Digestive system and respiration through other modes with accessory respiratory organs.
4. Circulatory system: evolution of heart and aortic arches
5. Urinogenital system: Succession of kidney, types of mammalian uteri and evolution of urinogenital ducts.
6. Comparative account of brain.
7. Classification of receptors, visual and auditory receptors in man.
8. Practical knowledge on scales in fishes, disarticulated skeleton of Frog, Varanus, Fowl, Rabbit.
9. Mammalian skulls: herbivorous and carnivorous animals.
10. Study of structure of heart, lung, kidney, eye and ear and skeletal modifications in vertebrates.

OUTCOME:

Students will be sufficed with the knowledge on the following:

1. Basic knowledge about the Integumentary, Digestive, Circulatory and Urinogenital systems.
2. Respiration through lungs and other accessory respiratory organs.
3. Brains in different vertebrates, their structural and functional specialities.
4. Human receptors and their efficiency.

CORE COURSE-IX

PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

To provide basic knowledge about:

1. Physiology of Digestion with structure and functions of gastrointestinal tract and associated glands.
2. Mechanical and chemical digestion of food, Absorptions of digested parts and hormonal control of digestive enzymes.
3. Respiratory tract: physiology, histology and mechanism of respiration with Control of respiration.
4. Circulatory and urinogenital physiology including: structure and function of kidney; Regulation of water and acid-base balance.
5. Components of blood and their functions with basic information regarding blood clotting system and blood groups.
6. Study on heart: Structure and working mechanism heart with cardiac cycle and regulation of heart rate.
7. Practical knowledge in laboratory works including: Blood grouping, RBC and WBC counting.
8. Estimation of hemoglobin in human blood
9. Recording of blood pressure using a sphygmomanometer and
10. Examination of sections of mammalian slides: oesophagus, stomach, duodenum, ileum, rectum liver, trachea, lung, kidney.

OUTCOME:

At the end of this portion of syllabus students will get sufficient theoretical and practical knowledge on:

1. Physiological aspects of digestion, circulation, respiration and excretion.
2. Histology and anatomy of heart, alimentary canal, lungs, kidney etc with the basic mechanism of their biological control.
3. Osmotic balancing mechanism of a living body with inter-relationship with nervous system.

4. Practical experience on studying different types of blood groups, TLC, TEC and haemoglobin percentage in humans.
5. Examination of histological sections of mammals.

CORE COURSE-X

BIOCHEMISTRY OF METABOLIC PROCESSES

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Students will gain knowledge about:

1. Stages of catabolism, compartmentalization of metabolic pathways, Shuttle systems.
2. Process and regulation of glycolysis, Citric acid cycle, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis.
3. Lipid Metabolism: β -oxidation and omega -oxidation of saturated fatty acids, ketogenesis
4. Protein Metabolism: Catabolism of amino acids: Transamination, Deamination, Urea cycle.
5. Oxidative Phosphorylation: Redox systems, Inhibitors and un-couplers of Electron Transport System.
6. Practical knowledge on: estimation of total protein in given solutions and detection of SGOT and SGPT or GST and GSH in serum/ tissue.
7. Study of the enzymatic activity of Trypsin, Lipase etc.

OUTCOME:

After completion of the course students will be able to know the following:

1. Metabolism and metabolic processes and their regulatory mechanism.
2. Reactions and regulation methods of carbohydrate, lipid and protein metabolism.
3. Oxidative Phosphorylation and Electron transport chain.
4. Practical knowledge on estimation methods of biomolecules including enzymatic activities.

CORE COURSE-XI

MOLECULAR BIOLOGY

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Students will gain sufficient knowledge on:

1. Structure of nucleic acids, DNA replication in prokaryotes and eukaryotes.
2. It helps the students to know about transcription and translation with post transcriptional modification and processing of Eukaryotic RNA.
3. Information on gene regulation and regulatory RNAs, Genetic Code.
4. Process of Protein synthesis and its regulation.
5. Experimental knowledge on study of DNA replication, polytene chromosomes.
6. Preparation of liquid and solid culture media.
7. Study of growth kinetics of *E. coli*.

OUTCOME:

Students will acquire knowledge on the following:

1. Knowledge on nucleic acids, DNA replication methods.
2. Information on transcription and translation processes and also on post transcriptional modification and processing of Eukaryotic RNA.
3. Gene regulation and regulatory mechanisms.
4. Laboratory experience on preparation of liquid and solid culture media.
5. Estimation of growth kinetics of *E. coli*.

CORE COURSE-XII

PRINCIPLES OF GENETICS

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Basically, in this unit it is aimed to provide sufficient information and knowledge on the following aspects:

1. Mendelian Genetics: Principles of inheritance, Incomplete dominance and co-dominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Sex-linked, sex-influenced and sex-limited characters inheritance. Polygenic inheritance
2. Linkage, Crossing Over and Chromosomal Mapping: cytological basis and molecular mechanisms.
3. Gene mutations, Chromosomal aberrations types and molecular basis of mutations.
4. Sex Determination & Extra-chromosomal Inheritance, mitochondrial mutations.
5. Recombination in Bacteria and Viruses & Transposable Genetic Elements.

6. Laboratory experiments on Study of Mendelian laws and gene interactions ,linkage maps based on data from conjugation, transformation and transduction.
7. Study of human karyotype (normal and abnormal).
8. Pedigree analysis of some human inherited traits.

OUTCOME:

Students will gain sufficient knowledge on:

1. Mendellism, linkage and crossing over.
2. Mutations, chromosomal aberrations and sex-determination methods.
3. Conjugation, Transformation, Transduction, Complementation test in Bacteriophage. Transposons in bacteria.
4. Laboratory experience on mendellian traits, study of human karyotype and human pedigree analysis.

CORE COURSE-XIII

DEVELOPMENTAL BIOLOGY

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

To impart detailed knowledge about the following:

1. Knowledge about gametogenesis and fertilization.
2. Details regarding cleavage, fate maps, blastulation and gastrulation.
3. To inform the students regarding fate of germ layers, structure, type and functions of placenta.
4. To increase understanding about post-embryonic developments including metamorphosis, regeneration and Ageing concepts and model.
5. Knowledge about prospects of developmental biology.
6. Experimental knowledge about study of whole mounts and sections of different developmental stages of frog and chick.
7. Information regarding in vitro fertilization, stem cells and amniocentesis.

OUTCOME:

After the successful completion of the course the students will be able to know the following:

1. The students will learn about gametogenesis, fertilisation and cleavage.

2. Sufficient idea about fate of germ layers, structure, type and functions of placenta.
3. Information regarding metamorphosis, regeneration and Ageing concepts and models.
4. Prospects and practical implication of developmental biology.
5. Practical knowledge about the whole mounts and sections of developmental stages of frog and chick.

CORE COURSE-XIV

EVOLUTIONARY BIOLOGY

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Providing necessary knowledge and information regarding:

1. Introduction to the idea of history of life, theories of evolution and extinction.
2. Historical review of evolutionary concepts: Lamarckism, Darwinism, Neo-Darwinism and evidences of Evolution
3. To acquaint with the knowledge of evidences of evolution and molecular clock concept.
4. To familiarize with the process of evolutionary change and types of natural selection, Genetic Drift and role of migration and mutation in changing allele frequencies.
5. To educate regarding Species concept and Speciation.
6. Concept of Origin and Evolution of man
7. Practical knowledge on fossil evidences from models and pictures.
8. Study of homology and analogy from suitable specimen.

OUTCOME:

The important outcomes of the course will be:

1. Idea about the history of life, theories of evolution and extinction.
2. Knowledge on evidences of evolution and molecular clock concept.
3. Understanding the process of evolutionary change and types of natural selection .
4. Brief idea about the principles of Population genetics.
5. Practical idea about fossil evidences from models and pictures with study of homology and analogy from suitable specimen.

ZOOLOGY- DISCIPLINE SPECIFIC ELECTIVE-I
ANIMAL BEHAVIOUR AND CHRONOBIOLOGY
(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

To make the students focused on the following:

1. Origin and history of Ethology.
2. Introduction and mechanism of the behaviour.
3. Patterns of Behaviour like reflexes, orientation, and learning.
4. Understanding social and sexual behaviour with suitable examples.
5. Historical developments in chronobiology and biological oscillation
6. Relevance of biological clocks, types and characteristics of biological rhythms.
7. Practical experiments on study of different types animal behaviour and study of nests and nesting habits of the birds and social insects.
8. Study of circadian functions in humans and visits to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioral activities of animals

OUTCOME:

Completion of the course will have the following outcomes:

1. Idea about mechanism of behaviour, patterns of behaviour like reflexes, orientation, and learning.
2. Experimental knowledge about social behaviour with suitable examples.
3. Enabling the students to analyse sexual behaviour, sexual dimorphism and courtship behaviour.
4. Experimental knowledge on study of different types animal behaviour and study of nests and nesting habits of the birds and social insects.

ZOOLOGY- DISCIPLINE SPECIFIC ELECTIVE-I
(Alternate choice)
ANIMAL BIOTECHNOLOGY
(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Providing necessary knowledge and information regarding:

1. To impart knowledge on concept and scope of biotechnology.

2. Basic idea about cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage etc.
3. Knowledge about Restriction enzymes, construction of genomic and cDNA libraries.
4. Transformation techniques and DNA finger printing.
5. To increase awareness about the production of cloned and transgenic animals.
6. Culture Techniques and their applications, molecular diagnosis of genetics diseases.
7. Practical experiments of Genomic DNA isolation from *E. coli* and to study the technique of DNA figure printing and restriction enzymes.

OUTCOME:

Course outcome shall be:

1. The students get information about concept and scope of biotechnology.
2. The students will have awareness about the transformation technique and DNA finger printing.
3. Proper knowledge about animal cell culture, molecular diagnosis of genetic diseases.
4. Idea about the production of cloned and transgenic animals.
5. Experimental knowledge of Genomic DNA isolation from *E. coli*, to study the technique of DNA finger printing and restriction digestion.

ZOOLOGY- DISCIPLINE SPECIFIC ELECTIVE-II

IMMUNOLOGY

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Basic objective of this paper is the following:

1. Historical perspective of Immunology, theories of Immunology.
2. Antigens and Immunoglobulins, factors influencing immunogenicity.
3. Structure and functions of different classes of immunoglobulins, antigen antibody interactions.
4. Structure and functions of MHC molecules. Endogenous and exogenous pathways of antigen processing and presentation.
5. Hypersensitivity and Vaccines, advances in vaccine production.
6. Practical experiments on study of lymphoid organs, histological study of spleen, thymus and lymph nodes.
7. Demonstration of ELISA and Bone marrow smears to study Immune cells.

OUTCOME:

After the completion of the course the students will be able to know:

1. Innate and Adaptive Immunity, artificial and natural Immunity, immune dysfunctions, autoimmunity.
2. Antigens and Immunoglobulins, Antigen antibody interactions, Immunoassays (ELISA Direct, Indirect, Competitive, Sandwich and RIA)
3. Major Histocompatibility Complex, Cytokines and Complement system.
4. Classification and brief description of various types of hypersensitivities Vaccines and various types of vaccines.
5. Experimental knowledge on histological study on different lymphoid organs, blood grouping and general idea about ELISA and other types of tests.

DISCIPLINE SPECIFIC ELECTIVE PAPER-III
WILDLIFE CONSERVATION AND MANAGEMENT
(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Teaching objectives of this paper will be:

1. Values of wild life, Conservation ethics and importance of conservation.
2. Conservation and protection Laws.
3. Habitat analysis: Physical parameters, Biological Parameters and standard evaluation procedures.
4. Management of habitats: Preservation of general genetic diversity and restoration of degraded habitats.
5. Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation.
6. Management planning of wildlife in protected areas.
7. Practical class education on identification of flora, mammalian fauna, avian fauna, herpeto-fauna of India and Odisha.
8. Familiarization and study of animal evidences in the field with various field study reports.

OUTCOME:

Students' knowledge on the following aspects will increase.

1. Values of wild life, world conservation strategies, wild animals of India and Odisha.
2. Habitat analysis, Standard evaluation procedures: remote sensing and GIS.
3. Advancing the successional process, preservation of general genetic diversity, wildlife trade and related laws.
4. Wildlife Census methods, Bio- telemetry, care of injured and diseased animal, Common diseases of wild animals.
5. Wildlife management planning, Eco tourism / wild life tourism in forests,
6. Tiger conservation and management challenges in Tiger reserve.
7. Practical experience about identification of flora and fauna, development of database.
8. Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, animal sounds.

DISCIPLINE SPECIFIC ELECTIVE PAPER-IV**PROJECT WORKS****OBJECTIVE:**

1. Each student has to undertake a project work under the guidance of a teacher and submit the project report in the form of a thesis.
2. There will be a presentation of the project work before an external examiner.

OUTCOME:

1. This increases the efficiency of the student to work almost independently in the field.
2. Gaining practical knowledge regarding the topics taught in the class room.
3. Result oriented approach of the students increases.

SUBJECT- ZOOLOGY Generic elective-1

ANIMAL DIVERSITY

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Through the teaching of above subject students will realize the following:

1. General characters of Protozoa, Porifera, Cnidarians, Helminthes and Nemethehelminthes;
2. Life cycle of Plasmodium, Taenia solium.
3. Canal system in Porifera, polymorphism in Cnidarians and Parasitic adaptations.
4. General characters of Annelida, Arthropoda, Mollusca and Echinodermata.
5. Social life in insects, torsion in gastropod, pearl formation, larval form in Echinodermata.
6. Protochordata, Pisces, Amphibia: Salient features, Osmoregulation, migration of fishes, adaptations for terrestrial life, Parental care in Amphibia.
7. Origin of reptiles, Terrestrial adaptations in reptiles,
8. Origin of birds, Flight adaptations, early evolution of mammals
9. Practical experimentations on study of specimens and permanent slides of non-chordates and chordates
10. Temporary mounting techniques.

OUTCOME:

After the successful completion of the course the students will be able to know the following:

1. General idea about general characters of protozoa to pseudocoelomate.
2. Migration of fish and parental care in amphibians.
3. Knowledge on canal system in porifera, polymorphism in hydrozoa, parasitic adaptation of helminthes and understanding general character of coelomates.
4. Knowledge on social life in insects and pearl formation
5. Information about salient features of protochordates, fishes, and amphibians.
6. Knowledge about the migration of fish and parental care in amphibians.
7. Study of museum specimen of non-chordates and chordates

SUBJECT- ZOOLOGY Generic elective-2

AQUATIC BIOLOGY

(CREDITS: THEORY-4, PRACTICAL-2)

OBJECTIVE:

Students will learn about:

1. Introduction of the aquatic biomes, freshwater ecosystem and coral reefs.
2. Origin and classification of lakes, lake as an Ecosystem, Lake Morphometry.
3. Physico-chemical characteristics of Light, Temperature, Thermal stratification.
4. Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity, dissolved gases, Nutrient Cycles in Lakes
5. Different stages of stream development, Physico-chemical, environment.
6. Marine Biology: Continental shelf, Adaptations of deep sea organisms.
7. Management of Aquatic Resources: aquatic pollution, causes, management and legislature.
8. Practical knowledge about determination of area of lake, identification of important biota,
9. Determination of Turbidity, Dissolved Oxygen, Alkalinity of lake/ water body.
10. Project report on Sewage treatment plant/Marine bio-reserve/ Fisheries Institutes.

OUTCOME:

Course outcome includes:

1. An idea about Freshwater ecosystems like lakes, wetlands, Streams and rivers, estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone etc.
2. Origin, classification and physic-chemical properties of lakes and streams.
3. Study of adaptations of deep sea organisms, Coral reefs and Sea weeds.
4. Causes of Agricultural, Industrial, Sewage, Thermal and Oil spills pollution and their management with proper legislature.
5. Determination of characteristics of lakes with information about the biota and necessary instrumentation for the study.