DEPARTMENT OF ZOOLOGY
PROGRAMME: B. SC.

Statement of Course Outcomes (COs)

B.SC. SEMESTER I

Paper – I
Life and Diversity of Animals - Nonchordates (Protozoa to Annelida)

By the end of this program, the students will acquire knowledge and they will understand the:

- General characters and classification of Protozoa, Porifera, Helminthes, Annelida.
- Structure and reproduction of Paramoecium, Plasmodium, Sycon, Obelia, Ascaris, Leech
- life cycle of Plasmodium, Obelia, Ascaris, Taenia solium.
- Parasitic Protozoans of Man- Mode of infection and its control, parasitic adaptations in helminthes.
- Trochophore larva- significance
- Canal system in sponges, corals and coral reef formation, Vermiculture and its importance.

Paper – II
Environmental Biology

By the end of this program, the students will understand the:

- Atmosphere (Hydrosphere, Lithosphere): Major zones and its importance, energy sources, Energy flow in an ecosystem.
- Ecosystem - Definition and types - pond ecosystem, Food chain, food
- web and ecological pyramids.
- Biodiversity and its conservation , causes of reduction , Hot spots in India, Wildlife conservation acts (1972 and 1984), national parks and sanctuaries .
- Sources, effect and control measures - air pollution, water pollution, noise pollution.
- Toxic effects of heavy metals- Bioaccumulation and biomagnifications

PRACTICAL – I

By the end of this programme, the students will be able to

- Study and Classify Life and Diversity of Animals – Nonchordates with the help of museum specimens, permanent slides, diagrams.
- Prepare temporary and permanent slides.
- Estimate DO, free CO_2, pH, total hardness of water sample.
- Study of pond ecosystem – analyze plankton quantitatively.
- Observe animals in natural habitat of National park and Sanctuary.

B.Sc. Semester – II

Paper – III
Life and Diversity of Animals – Nonchordates (Arthropoda to Hemichordata)

By the end of this programme, the students will be able to understand

- General characters and classification up to classes: Arthropoda , Mollusca, Echinodermata, Hemichordata

- study the Morphology and anatomy of Cockroach, Pila, Asterias, Balanoglossus.
- Insects as Vectors, Social behavior in honey bees & Pearl formation in Mollusca
- Study the larval forms -crustacea, Mollusca, Echinoderms.
- Affinities of Balanoglossus.

Paper – IV
Cell Biology

By the end of this programme, the students will get knowledge and they will understand the:
- Ultra structure of prokaryotic and eukaryotic cell,
- structure and function of Cell organelles.
- Oxidative phosphorylation, Glycolysis and Kreb's cycle & Electron Transport Chain and
- terminal oxidation.
- Giant chromosomes: Lamp-brush and polytene chromosome
- Cell cycle and Mitosis ,Meiosis (different phases and significance),
- 6)Cellular ageing and cell death, Elementary idea of cancer and its causative agents.

PRACTICAL – II

By the end of this programme, the students will be able to :

Section A
- Study and classify Life and Diversity of Nonchordates .
- Prepare temporary and permanent slides.

Section B: Cell Biology
- Study the ultra structure of prokaryotic cell & eukaryotic cell .
- observe osmosis in human RBCs , Barr body in blood smear.
- prepare and observe the mitotic cell division in onion root tips , meiosis in Tradescantia bud/ Grasshopper testis by squash method .
- study the salivary gland chromosome in Chironomous larva.
- prepare and observe the mitochondria in buccal epithelium/ lip mucosa .
- Use ocular micrometer to measure micro objects.

B.Sc. Semester – III

Paper – V
Life and Diversity of Animals - Chordates (Protochordata to Amphibia)

By the end of this programme, the students will be able to understand
- General characters and classification up to classes: Protochordata, Pisces, Amphibia, & Agnatha
- The Morphology and anatomy of Herdmania, Amphioxus.
- *R*etrogressive metamorphosis of ascidian tadpole of Herdmania.
- Scales of fishes ,origin of paired fins ,migration and accessory respiratory organs and Embryology.
- Parental care and Neotony in Amphibia .
- Frog Embryology & Development of respiratory organs & Aortic arches in frog .

Paper – VI
Genetics

By the end of this programme, the students will be able to understand
- Mendelian Principles& laws.

- Interaction of genes, quantitative genetics & extra nuclear genome .
- Cytoplasmic inheritance, Linkage and crossing over.
- Concepts of genes & Genetic disorders in human.
- Sex determination.
- Gene mutations & Lethal genes.
- Population genetics, Genetic counseling & Applied genetics

PRACTICAL – II
Section A :Life and Diversity of Animals – Chordates (Protochordata to Amphibia)
By the end of this programme, the students will be able to

- Identify, classify and distinguish the characters and adaptive features of animals from Urochordata , Cephalochordata ,Cyclostomata , Pisces & Amphibia .
- Describe Digestive system ,Reproductive system &Brain of locally available culturable Fish.
- Explain the histology of Amphioxus and embryology of Frog from the permanent slides .
- Prepare the permanent stained slide .

Section B : Genetics
- Uunderstand monohybrid and dihybrid ratio
- Study of normal human karyotype (Normal male and female)
- Study characters and karyotypes of Syndromes.
- Study the genetic traits .

B.Sc. Semester IV

Paper - VII
Life and Diversity of Animals – Chordates (Reptilia, Aves and Mammals)
By the end of this programme, the students will be able to
- Identify, classify and distinguish the characters and adaptive features of animals from
- Reptilia, Aves & Mammals.
- understand Poison apparatus, biting mechanism, snake venom and its importance.
- understand Comparison of Ratitae and Caranitae, Flight adaptations and migration .
- understand theories of evolution & genetic basis of evolution.
- understand Adaptations in animals.
- understand Races in Man
- understand Comparative account of aortic arches and heart in Reptiles, Birds and Mammals
- understand embyology of Mammals & chick
- understand Stem cells .
- understand Biological clock : Diurnal and rhythmic behavior in birds and mammals
- understand the Role of pheromones in reproductive behavior

Paper VIII
Molecular Biology and Immunology
By the end of this programme, the students will be able to understand
- Structure & properties of DNA, RNA as genetic material ; DNA replication.
- Recombination in Bacteria.
- Genetic code & Protein synthesis.
- Gene regulation .
- Concepts of immunity, Structure, types and functions of Antigen & Antibody.

- Antigen-antibody interaction .Types of immune response.
- Complement system, Cytokines.
- Autoimmunity and immunodeficiency.

PRACTICAL – IV
Section A : Life and Diversity of Animals – Chordates
(Reptilia, Aves and Mammals)

By the end of this programme, the students will be able to understand
- Identify, classify and distinguish the characters and adaptive features of animals from
- Chordates (Reptilia, Aves and Mammals)
- skeleton of Rabbit and Fowl .
- chick embryology from W.M.
  Filoplume & skin of Bird, Skin of Mammal.

Section B: Molecular Biology and Immunology
Molecular Biology

By the end of this programme, the students will be able to
- perform staining of DNA and RNA from blood smear of various animals.
- understand basic laboratory instruments and equipments.
- 3) perform calculations of Molarity and normality of solutions .
- Isolate Genomic DNA from any available source.

Immunology
- Determine blood groups in humans.
- Perform Antigen – Antibody interaction by double diffusion method (Ouchterlony).
- Study of histological slides of organs of immune system.

B.Sc. Semester V
Paper IX
General Mammalian Physiology

By the end of this program, the students will understand the:
- Importance of vitamins & Enzymes-biocatalyst,
- Glands and hormones associated with digestion.
- and explain the physiology of digestion , respiration, circulation
- Blood pressure, E.C.G. & working of Heart.
- Composition of blood, respiratory pigments in mammals.

Paper X
Applied Zoology

Students will get knowledge and will be able to:
- Establish their own aquaculture unit, aquarium .
- Culture prawn and oyster (for pearl).
- Identify insects pest (agriculture and veterinary).apply ways to control them
- Understand the types of Silkworm, their Life cycle and economic importance.
- Establish their own sericulture , apiculture, lac culture units.

PRACTICAL V

Section A: General Mammalian Physiology - I

Section A: General Mammalian Physiology – I

By the end of this programme, the students will be able to:

- Detect the action of salivary amylase on starch.
- Detect the presence of carbohydrates, proteins, Lipids, Vitamin A and Vitamin C in given sample.
- Measure lung capacity .
- Prepare slide of Haemin crystal.
- Total WBC and RBC count from blood.
- Understand histology of digestive and lungs.

Section B : Applied Zoology –I (Aquaculture and Economic Entomology)
Aquaculture:

By the end of this programme, the students will be able to:

- 1. Collect and identify Freshwater edible fishes & Aquarium fishes .
- 2. explain the digestive, reproductive systems and brain with pituitary of culturable fishes & the Gonosomatic index
- 3. Fabricate and set up own aquarium
- 4. Mount the Scales of fishes, zooplankton .

B.Sc. Semester VI

Paper -XI
General Mammalian Physiology

By the end of this program, the students will receive knowledge and they will be able to understand the:

- E.M. structure ,types of Neurons & conduction of nerve impulse .
- Ultrastructure & properties of striated muscle .
- Muscle contraction- sliding filament theory.
- Structure & function of uriniferous tubule.
- Normal and abnormal constituents of urine, dialysis.
- Structure and functions of endocrine glands.
- Oestrous and menstrual cycle ,male and female sex hormones , Contraceptives .
- Causes of infertility ,In-vitro fertilization.

Paper - XII
Applied Zoology II
(Biotechniques, Microtechnique, Biotechnology, Bioinformatics and Biostatistics)

By the end of this programme students will able to understand :

- Sterilization methods, Separation of biomolecules; Chromatography (Elementary idea) ,Electrophoresis.
- Pprinciples of colorimeter and spectrophotometers.
- The microtechnique procedure.
- Histochemical staining techniques for carbohydrates, proteins and lipids .
- Recombinant DNA technology, application of biotechnology: Insulin and vaccine

production.
- Bioinformatics: Definition, Basic concepts ,importance and its role in life sciences & Bioinformatics databases.
- Biostatistics.

PRACTICAL VI
By the end of this programme, the students will be able
- To detect of urea, albumin, sugar and creatinin from urine .
- To count the sperms from given semen sample .
- To describe the endocrine glands of culturable fishes
- To identify and explain the histology of kidney, endocrine glands, uterus, placenta, nerve fibre, muscles of mammals.
- To separate amino acids by paper chromatography
- To separate proteins by electrophoresis technique
- To develop skill in microtechnique.
- To demonstrate the carbohydrates, proteins and lipids by histochemical methods
- To determine mean, mode, median from a given biostatistical data
- To represent statistical data graphically using computers.

Physiology helps to understand the mechanism or working of body, its systems , its tissues, the cells and the biomolecules .
It helps to understand how homeostasis is maintained in body, in response to changes in environmental factors.
It helps to understand processes of life in healthy and diseased states.
- Bioinformatics is the currently popular term for **the application of computational and analytical methods to biological problems.**
- To study the origin of diseases at molecular level the study of molecular data (i.e DNA, RNA & Proteins), its analysis and interpretation is done with the help of computational biology or bioinformatics .
- The information of gene structure, gene sequence and expression, protein structure and function can then be applied to gene-based drug discovery and development, development of anti microbial agents and vaccines.
- application of bioinformatics programs is very *useful, easier, and shorter process* and at much *lower cost.*