DEPARTMENT OF ZOOLOGY

Govt. P. G. COLLEGE RAMNAGAR

COURSE OUTCOMES: B.Sc. 1

Lower Non-Chordata

On completion of the course, students are able to:

1. Study and understand the salient features and outline classification of whole phyla included in Protozoa, Porifera, Coelenterata Helminthes.

2. Understand the structure and functions of canal system and affinities of Porifera.

3. Understand the life history, pathogenicity and control measures of various parasites such as Trypanosoma, Leishmania and Entomoeba.

4. Understand the polymorphism in Coelenterata.

5. Understand the brief account of corals and coral reefs.

Higher Non- Chordata

On completion of the course, students are able to:

1. Study and understand the salient features and outline of the classification of whole higher non- chordate Phyla included in protozoa, Annelida, Arthopoda Mollusca, and Echinidermata.

2. Understand the external features and mode of feeding and reproduction.

3. Understand the external features and parasitic adaptation in hirudinaria.

Cell biology

On completion of the course, students are able to:

1. Understand animal cells and various cell organelles by using microphotographs.

2. Understand the structure and function of various cell organelles- Mitochondria, Ribosomes, Lysosomes, E.R., GolgiComplex.

3. Understand the Cell-cycle, mitosis and meiosis.

4. Understand the idea of cell transformation and cancer.

COURSE OUTCOMES: B.Sc. Zoology Semester-II

Molecular Biology

On completion of the course, students are able to:

1. Understand the structure and function of Nucleic acids (DNA& RNA) Watson and Crick DNA double helix model.

2. Understand the structure and function of PCR and its significance.

3. Understand the introduction application of biological techniques.

4. Understand the Tools and Techniques in Molecular Biology.

5. Understand the DNA finger printing.

Taxonomy, Evolution and Elementary Palaeontology

On completion of the course, students are able to:

1. Understand the introduction to taxonomy and systematic their relationship and significance.

2. Understand brief concept and evidences of evolution Lamarckism, Darwinism, synthetic theory of evolution.

3. Understand the kinds of fossils and their significance.

Genetics

On completion of the course, students are able to:

1. Understand the introduction to taxonomy and systematic their relationship and significance.
2. Understand brief concept and evidences of evolution Lamarckism, Darwinism, synthetic theory of evolution.
3. Understand the kinds of fossils and their significance.

B.Sc. Zoology: Semester-III

Paper I: Lower Chordata

1. To study and understand the salient features and outline classification (up to order) of various lower chordate groups as covered under respective taxonomic groups.
2. To study and understand the Parental care in fishes and relation to man
3. To study and understand the Amphibian General Characters and affinities and Parental care.

Paper II: Higher Chordata

1. To study and understand the salient features and outline classification (up to order) of various Higher chordate groups as covered under respective taxonomic groups

2. To study and understand the poisonous and non- poisonous snakes, poison apparatus and snake venom & anti-venom.

3. To study and understand the flightless birds and their distribution, flight adaptations in birds, bird migration and economic importance of birds.
4. To understand the adaptive radiation with particular reference to aquatic mammals.

Paper III: Ecology and Environmental Biology

1. To study and understand the ecology and its relation to humanity

2. To study and understand the energy flow in ecosystem, pyramids of number, biomass and energy.

3. To study and understand the biosphere, biogeochemical cycles: Carbon and Nitrogen cycles.

4. To study and understand the definition and characteristics of density, natality, mortality, migration, growth and growth-curves.

5. To study and understand the Biodiversity and conservation and management of biodiversity

6. Pollution and its control.

B.Sc. Zoology: Semester-IV

Paper I: Developmental Biology

1. To study and understand the significance of fertilization
2. To study and understand chemical and metabolic events during gamete formation and types of eggs.
3. To understand regeneration in invertebrates (Hydra and Planaria) and Vertebrates (Limb regeneration in Amphibia).

Paper II: Applied Zoology

1. To study and understand the elementary knowledge of: (a) Aquaculture (b) Sericulture (c) Apiculture (d) Lac culture (e) Pearl culture (f) Piggery

Paper III: Elementary Entomology and Applied Ichthyology

1. To study and understand the parental care, social life in insects.

2. To study and understand the classification of fishes up to orders, integrated fish farming and migration in fishes.

B.Sc. V Semester

Paper I: Microbiology

1. To study and understand Typical structure of a bacterium, Gram positive and Gram negative bacteria and virus
2. To study and have a brief knowledge of AIDS
3. To study and understand Industrial microbiology- Food production, dairy products, fermented food, alcoholic beverages, microbial spoilage, and food preservation.
4. To study and have a brief knowledge of Antibiotics.

Paper II: Animal Behaviour

1. To study and understand patterns of behaviour : (i) Fixed action patterns(ii) Sign or key stimulus or releasers and (iii) Innate releasing mechanism, Instinctive behaviour.
2. To study and understand Stereotype innate behaviour: Kinases, Taxes and Reflexes. To study and understand Song learning in birds.
3. To study and understand the Communication: Chemical, Visual, Auditory, Electric and tactile,
4. To study and understand the Dance language of honeybees andiological clocks.
5. To study and understand Bird migration with particular reference to the mechanisms of navigation.

Paper III: Toxicology and Histology

1. To study and understand general principles of toxicology, its brief history, environmental toxicology (kinds and sources of toxic agents- animal toxins, plant toxins, pesticides, metals and food additives) and metabolism of toxic substances.
2. To study and understand the dose response relationship, toxic response of blood, organ function tests, teratogenic, reproductive and carcinogenic tests.
3. To study and understand the Histology: Structure of epithelium, connective tissue, cartilage, bone, smooth,, striped and cardiac muscles, and nervous tissue as studied under light microscope.
4. To study and understand the Histological structure of gonads, liver, lung, pancreas and kidney in mammals.

B.Sc. Zoology: Semester-VI

Paper I: Biological Chemistry and Basic Mammalian Endocrinology

1. To study and understand the introduction to biological molecules: Proteins, Amino acids, Carbohydrates, Lipids, Vitamins and Enzymes- their structure, classification and significance and metabolism of Carbohydrates.
2. To study and understand the Endocrinology: General characteristics of endocrine system, mechanisms of hormone action (cellular and sub cellular).
3. To study and understand hormonal functions of the glands namely, Pituitary, Thyroid, Pancreas, Adrenal, Testis and Ovary.
4. To study and understand the Nutrition: Food constituents, intracellular and extracellular digestion, Digestion and absorption of carbohydrate, fat and protein.
5. To study and understand the Respiration: Pulmonary ventilation, respiratory pigments, gaseous transport and control of respiration.
6. To study and understand the ammonotelic, ureotelic and guanotelic animals, urine formation in mammals.
7. To study and understand the Blood vascular system and functions of blood, blood coagulation.
8. To study and understand the Nervous system: Resting and action potential of nerves, synapse and transmission of nerve impulse.
9. To study and understand the Muscular system: Muscle contraction and its Mechanism. A brief idea of tetanus and fatigue.

Paper III: Bioinformatics and Biostatistics

1. To study and explore the elementary knowledge of computers: Organisation of computer, input and output devices, elementary idea of software, hardware and programming languages.

2. To study and understand the use of computers in biological sciences: Sequence, structure and strain databases and their use

3. To study and understand biostatics as a tool in research, Data collection- Random and non-random sampling, data tabulation and data presentation (Graph, Histogram, Scatter diagram),

4. To study and understand Concept of mean, mode, median and of standard deviation and standard error.

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DEPARTMENT OF ZOOLOGY

Govt. P. G. COLLEGE RAMNAGAR

M.Sc.I, II, III & IV Semester

Microbiology: On completion of the course, students are able to:

1. Describe general introduction to Microbiology, kinds of microorganisms and their natural habitat
2. Understand Microbial morphology and physiology, Microbial media &Culture techniques
3. Understand Microbial Growth, Mathematical expression of growth, growth curve, measurement of growth and growth yields, synchronous growth, growth as affected by environmental factors like temperature, acidity, pH, water availability and oxygen.
4. Understand Viruses: Structure and composition, classification, physical properties and viral action, isolation, culture and purification of viruses, Viroids & Prions, RNA & DNA viruses, production of vaccines
5. To understand microbiology of Water, microorganisms of soil, factors affecting microbial community in soil, microorganisms associated with organic matter decomposition, rhizosphere microorganisms, cycles of elements (Carbon, Sulphur and Nitrogen)
6. To understand microbiology of air, food, sources of food poisoning, some fermented foods, preservation of foods.

Non-Chordata: On completion of the course, students are able to:

1. Understand different groups of invertebrate animals are studied in this including Protozoa, Porifera, and coelenterate, Plathyhelminthes, Annelida, Arthropoda, Mollusca and Echinodermata.
2. Understand general characters and classification upto order, some special features, organs, pathogenecity, life history and significance are studied here.
3. Understand parasitic adaptation and life- cycle in different phylum.
4. Understand torsion and pearl formation in mollusca.
5. Describe Phylum Nematodes and give examples of pathogenic Nematodes Ecology

Paper III – Ecology: On completion of the course, students are able to:

1. Understand Ecology: Its relevance to human welfare, subdivisions and scope.
2. Understand the Environment: physical environment; biotic environment; biotic and abiotic interactions, ecosystem diversity, ecosystem services
3. Understand Ecosystem's structure and function: Abiotic and biotic components of aquatic (Lake) and Terrestrial (forest) ecosystems.
4. Understand Laws of limiting factors, impact of temperature, moisture and pH on organisms.
5. Understand Indicators of pollution and eutrophication

Taxonomy and Evolutionary: On completion of the course, students are able to:

1. Understand general taxonomic rules on animal classification.
2. Understand preservation and identification of insects and other specimens using Keys.
3. Gain knowledge of functional anatomy of vertebrates from fishes to mammals.

Molecular Biology: On completion of the course, students are able to:

1. Understand Knowledge about genetics, developmental biology and organogenesis
2. Understand Application of DNA technology and molecular biology for research
3. Understand Gains knowledge about Fine structure of gene, types of mutations, mutagens, Detection of sex linked lethal and visible mutations in Drosophila.
4. UnderstandProkaryotic and Eukaryotic transcription, RNA polymerase.
5. UnderstandIntroduction and landmarks in DNA sequencing.

Concepts in Cell Biology and Genetics: On completion of the course, students are able to:

1. Understand about genetics, developmental biology and organogen
2. Understand structural and functional aspects of basic unit of life i.e. cell concepts
3. Understand concept behind genetic disorder, gene mutations- various causes associated with inborn errors of metabolism
4. Understand different cellorganelles, their structure and rolein living organisms.
5. Understand Biology of cancer: Oncogenes and Tumor Suppressor Genes, Viral and cellular oncogenes, tumor suppressor genes from humans
6. Understand Mendelian genetics: Dominance, segregation, independent assortment, Extensions of Mendelian principles: Codominance, incomplete dominance, gene interactions

Mammalian Endocrinology: On completion of the course, students are able to:

1. Understand the relevance and depth of environmental endocrinology
2. Understand chemical nature, classification and mode of secretion of hormones, hormonal feedback in homeostasis
3. Define and explain the basicprinciples of reproductive endocrinology: Molecular structure, origin, release and transport of sex hormones and their role in reproductive physiology.
4. Students will acquire a broadunderstanding of the hormonalregulation of physiologicalprocesses in invertebrates andvertebrates.

Biochemistry: On completion of the course, students are able to:

1. Understand basic knowledge about various bio molecules and their role in metabolism
2. Understand Classification of enzymes, enzyme kinetics
3. Understand Metabolism of carbohydrates, nucleic acids and metabolic disorders
4. Understand Basic concept of xenobiotic.
5. Understand Chemical structure and significance of coenzymes.

Animal physiology: On completion of the course, students are able to:

1. Understand the entire functions of animal body. It includes nutrition, respiration, heart, excretion, nerve physiology etc, in which all structure, function, process and control.
2. Understand detailed concepts of digestion respiration excretion the functioning of nerves and muscles
3. Understand fundamental knowledge of animal physiology
4. Understand Immunity, types of Immunity (Natural Immunity, Acquired Immunity: Active Immunity, Humoral Immunity, and Cell mediated immunity).

Chordata: On completion of the course, students are able to:

1. Understand conceptual knowledge of vertebrates, their adaptations and associations in relation to their environment
2. Understand characters and affinities of Cyclostomata
3. Understand charactersof phylum Protochordates to Mammalia.
4. Understand complex vertebrate interactions.
5. Understand basic concepts of developmental biology
6. Understand aquatic and flying adaptations in mammals

Animal Behaviour: On completion of the course, students are able to:

1. Understand Animal Behaviour and Environment
2. Understand Tools and Techniques for the study of animals in wild: Animal Identification.
3. Understand types of Social Acts, Social Organizations in Termites and Primates, Parental Care with emphasis on Insects, Fishes, Amphibians, Birds and Mammals
4. Understand nderstand Various kinds of Animal adaptations
5. Understand types of Migration, Causes of Migration, Advantages of Migration, Methods of Studying of Migration, Orientation and Navigation

Developmental Biology: On completion of the course, students are able to:

1. Understand mechanism of fertilization, early and late changes in egg organisation caused by fertilization,
2. Understand development and functions of the foetal membranes in mammals Complex Vertebrate interactions.
3. Understand basic concepts of developmental biology
4. Understand distribution of regenerative ability, polarity in regeneration, mechanism of regeneration of amphibian limb and lens,

Biotechnology: On completion of the course, students are able to:

1. Understand origin, definition, scope and importance of biotechnology Biotechnology in India

2. Understand genetic engineering in animals, cells in culture, growth of cell lines

3. Understand use in recombinant DNA technology, genetic manipulations and in a variety of industrial processes.

4. Understand Bioremediation

Bio-Instrumentation, Biostatistics and Computational Biology

On completion of the course, students are able to:

1. To understand principles and techniques of Microscopy

2. Understand Tools, Techniques and Biostatistics: Understanding of basic concepts of instrumentation such as centrifugation Chromatographic techniques,
3. Understand Students gain skills in techniques of chromatography, electrophoresis, spectroscopy and PCR
4. Understand Students gain skills in basics of computers, operating systems, overview of programming languages
5. Understand Application of internet and statistical bioinformatics in research

M.Sc. Vth Semester

Specialization (Fish and fisheries)

Paper – I (a) General Ichthyology

On completion of the course, students are able to:

1. Understand gains knowledge of Classification of fishes, Systematic position, habit and habitat,
2. Understand Locomotion in fishes
3. Understand brief knowledge of sexual dimorphism and courtship
4. Understand Parental care in fishes
5. Understand Hill stream adaptations
6. Understand Venomous and non-venomous fishes
7. Understand Fish pheromones, and Coloration in fishes

Paper – II (a) Applied Ichthyology

On completion of the course, students are able to:

1. Understand general survey of the marine, estuarine and inland capture fisheries of India with particular reference to fishery resources of Uttaranchal
2. Understand methods of fishing: Fishing gears and crafts, Cold water fishery
3. Understand Ecology and productivity of fish ponds, Pollution in relation to fisheries.
4. Understand Exotic fishes and their merits and demerits.

Specialization (Entomology)

Paper I (b): Systematics and Applied Entomology

Entomology:On completion of the course, students are able to:

1. Classify insects and have knowledge of beneficial and non-beneficial insects
2. Understand methods of collection, preservation and culture of insects
3. Understand Classification of Insects
4. Understand Role of insects in spread of diseases
5. Understand Parental care in insects
6. UnderstandPrinciples and Practices of Pest Control

Paper II (b) – Biology of Insects: Morphology, Physiology & Development

On completion of the course, students are able to:

1. Understand structure of an insect head, thorax and abdomen; Appendages of head (mouthparts and antennae) and thorax (legs and wings).
2. Understand structure and functions of blood and mode of circulation in insects.
3. Understand structure and functions of different types of visual and sound producing organs in insects.
4. Understand structure of pheromone producing glands, different types of pheromones and their chemical nature.

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