Programme Outcomes: M.Sc. Zoology

After successful completion of two years degree program in Zoology a student is able to;

- 1. Identify and classify all Animal phylum from protozoa to Mammals, also understand the evolutionary relationship and their taxonomic aspects.
- 2. Knows the concept, process, physiology, and molecular basis of animal development. Also knows about the economic importance of various species, honeybees, lac insects, fruit fly, Sericulture, Apiculture etc.
- 3. Students know about economically important Fishery, Poultry, Animal husbandry etc.
- 4. Understand the application of Bio-pesticides; know about sources, methods and production of bio-fuel.
- 5. In Biotechnology student gain knowledge about various techniques such as Elisa techniques, DNA sequencing, DNA finger printing techniques, Somatic cell hybridization, cloning Human Genome project etc.
- 6. Students learn the basic biostatistics, experimental statistics and bioinformatics.
- 7. To be aware of various parasites and diseases which spreads in human with the help of study of host-parasite relationship
- 8. To increase awareness for the health in self and society.

Programme Specific

Outcomes

- 1. Students acquire knowledge through practical work in fields as well as in laboratory.
- 2. Project helps for creating research attitude among the postgraduate students.

M.Sc. Zoology

Semester I Course Outcomes

Course I (Biosystematics and Taxonomy)

After completion of these courses students should be able to understand

- 1. Definition and basic concepts of Biosystematics and taxonomy
- 2. Trends in Biosystematics-concepts of different conventional and newer aspects
- 3. Dimension of speciation and species concept
- 4. Theories of biological classification ,kinds & component of classification, Phyletic Lineages, Linnaean hierarchy
- 5. Taxonomic collections, methods & data recording
- 6. Zoological Nomenclature, Conservation of diversity

Course II (Structure and Functions of Invertebrates)

- 1. Organisation of Coelom
- 2. Locomotion in Protozoa, Coelentrata, Annelida and Echinodermata
- 3. Pattens of feeding and digestion in lower metazoa, Filter feeding in Polychaeta Mollusca and Echinodermata
- 4. Organs of respiration: Gills, Lungs and trachea, respiratory pigments and mechanism of respiration

- 5. Organs of excretion: coelom, coelomoducts, Nephridia and Malphigian tubules
- 6. Primitive and advanced nervous system
- 7. Invertebrate larvae

Course III (Insect Diversity and Physiology)

After completion of these courses students should be able to;

- 1. To understand insect Diversity, morphology, anatomy and physiology
- 2. To understand classification and phylogeny of Apterygotes, Exopterygote and Endopterygote insects.
- 3. To understand the comparative and histological studies of systems such as digestive, respiratory, nervous, circulatory, excretory and reproductive system.
- 4. Insects growth and metamorphosis
- 5. Insects as vectors of human diseases
- 6. Insects of commercial Importance and their culture; honeybees, Silkworm and Lac Insect
- 7. Brief idea about chemical and biological control of insect pests
- 8. To understand receptors and sound producing organs.

Course IV (Biology of Parasites)

After completion of these courses students should be able to;

- 1. Introduction Origin and Evolution of Parasitism
- 2. Morphology, Life cycle, pathogenicity and prophylaxis of Protozoan parasites, Trematodes, Cestodes, animal and plant nematodes.
- 3. To be aware of various parasites and diseases which spreads in human with the help of study of host-parasite relationship.
- 4. Increase awareness for the health in society.

Semester II Course Outcomes

Course V (Cell and Molecular Biology)

- 1. Structural organization of Plant and animal Cell: Cell wall: structure, function and biogenesis Plasma membrane models, functions
- 2. Plasmodesmata comparison with gap junctions.
- Plant vacuoles: Structure and fuctions of microbodies: Golgi apparatus, lysosomes, endoplasmic reticullum, Chloroplast and mitochondria: Structure, biogenesis of mitochondria, Nucleus: structure, nuclear pores, nucleosome organization, nucleolus. The cytoskeleton: Organization and role of microtubules and microfilaments, motor movements implications in flagellar and other movements.
- 4. Cell cyle and apoptosis: Control mechanisms
- 5. Gene expression: DNA structure: Transcription, promoters and transcription factors, differences in propkaryotes and eukaryotes .Translation mechanism
- 6. Regulation of gene expression in prokaryotes and eukaryotes

7. Protein sorting: Targeting of proteins to organelles

Course VI (Biostatistics and Computer Applications)

After completion of these courses students should be able to;

- 1. Brief description and tabulation of data and its graphical representation.
- 2. Mean, median, range, standard deviation and variance. Correlation and simple linear regression.
- **3.** Sampling: Sampling Techniques, level of significance, tests of significance (F & t test), chi-square test
- 4. Computers languages, binary number system, flow charts, programming techniquesdata structures and database concepts, internet and its applications.
- 5. MS OFFICE software, Computer Oriented statistical techniques.
- 6. Bio-informatics.

Course VII (Comparative Anatomy of Vertebrates)

After completion of these courses students should be able to understand

- 1. Origin of Chordata, Concept of Protochordata and Importance of vertebrate morphology
- 2. Origin and Classification of Vertebrates
- 3. Vertebrate Integument and its Derivatives ; development, general structure and functions of skin and its derivatives (glands scales, horns, claws, nails, hoofs, feathers and hairs)
- 4. Comparative anatomy of alimentary canal in vertebrates
- 5. Evolution of heart and aortic arches
- 6. Comparative account of respiratory organs
- 7. Form function, body size and skeletal elements of the body
- 8. Evolution of Urinogemital system in vertebrate series
- 9. Sense organs and Nervous system: Comparative anatomy of the brain and spinal cord in relation to its functions

Course VIII (Developmental Biology)

- 1. Science of developmental biology and its applications
- 2. Developmental patterns in metazoan.
- 3. Germ cell migration in amphibian, birds and mammals and their differentiation into sperm or egg.
- 4. Spermatogenesis and Oogenesis in details
- 5. Gamete binding and fusion, role of egg membranes and activation of egg
- 6. Creation of multicellularity; Cleavage characteristics and patterns (radial, spiral, bilateral, rotational)
- 7. Gastrulation in Frog and Chicks and the related fate maps
- 8. Concept of Organizers and induction and the mechanism involved.
- 9. Chemical basis of differentiation and organogenesis

- 10. Development of placenta its different types and functions/importance of hormones released by it.
- 11. Idea of Embryo transfer technology

Semester III Course Outcomes

Course IX (Cytogenetics& Evolution)

After completion of these courses students should be able to understand

- 1. Chromosome Organization; DNA packaging and DNA replication, Metaphase chromosomes and its importance,
- 2. Chromosome banding , structure and function of Polytene and lampbrush chromosomes , Sex chromosomes and sex determination
- 3. Mendelian and non-Mendelian Inheritance and their modifications, Variations in chromosome structure and number
- 4. Gene expression and its regulation
- 5. Gene mutations and their consequences
- 6. Population genetics and evolution.
- 7. The Hardy-Weinberg Equilibrium
- 8. Factors that change allele frequencies in populations
- 9. Origin and evolution of species; Biological species concept ,Allopatric, parapatric and sympatric speciation, Neo-Darwinism,Shifting-balance Theory of Evolution , Neutral theory of molecular evolution

Course X (Immunology and Biotechnology)

- **1.** Innate and acquired immunity, humoral and cellular immunity benefits and damaging effects of immunology.
- 2. Cells of immune system; primary and secondary lymphoid organs.
- 3. Antigens, its major classes and its physicochemical properties.
- **4.** Immunoglobulins: Structure, function, classes and subclasses of human immunoglobulins.
- 5. Complement system: proteins and pathways of complement activation
- **6.** Antigen-antibody reactions; Precipitation, agglutination immune fluorescence, radio immunoassay, ELISA.
- 7. Monoclonal antibodies: Hybridoma technology
- 8. Hypersensitivity Anaphylaxis, delayed-type hypersensitivity
- **9.** Biotechnologyscope and significance; Principles and techniques of plant and animal cell culture, Principles and applications of DNA recombinant technology in agriculture and human diseases, development of transgenics.
- 10. Construction of genomic/c DNA libraries, PCR and DNA finger printing. Fermentation technology, production of antibiotics, beverages, enzymes, ethanol and methane from biomass; bioremediation, biopesticides and biosensors, single cell protein.

Course-XI Applied Zoology

After completion of these courses students should be able to understand

- 1. Sericulture; Mulberry and Non-mulberry sericulture-Tassar, Muga and Ericulture: Sericulture industry in India.
- 2. Apiculture; Apicultural practices, Hive products, Bee pasturage and Beekeeping industry in India.
- 3. Methods of pest control-Chemical Biological, Microbial and Integrated control; Biology and control of insect pests and phytoparasitic nematodes
- 4. Biology and control of medically important organisms Mode of transmission and brief epidemiology of some important diseases. Cholera, Typhus, small pox, plague, Malaria, Dengue fever, Filariasis& AIDS
- 5. Vaccination: Immunization; different types of vaccines; Current status of malarial vaccine.
- 6. Wild Life ManagementObjective of wild life conservation and conservation strategies
- 7. Pisciculture: fish culture and their management, Fish enemies, diseases and their control; Importance of fish culture and fishing gears
- 8. Metabolic and Muscular disorders with regard to major food stuffs absorption and various types of myopathies (congenital, metabolic, endocrine, toxic and inflammatory
- 9. Wild life protection in India and classification of threatened species, protected wild animals, protected areas and their management in India Endangered fauna and special projects for endangered species.

Course-XII General Physiology

After completion of these courses students should be able to understand

- 1. Nutrition and digestion of proteins, fats and carbohydrates
- 2. Structure and functions of bloods vessels, blood pressure and blood flow, resistance and interrelationships. Vascular distensibility and compliance
- 3. Transport of O2 and CO2, distribution and physiology of respiratory pigments, Buffer systems and respiratory regulation of acid base balance
- 4. Functional anatomy of mammalian kidney and its renal unit, role of antidiuretic hormone and aldosterone
- 5. Ultrastructure of a skeletal muscle, mechanism of contraction and biochemistry of actomyosin ATPase reaction
- 6. Hormones, their functions, regulation and metabolism
- 7. Reproductive physiology, Receptor Physiology and Environmental Physiology

Semester IV Course Outcomes

Course XIII (Biochemistry)

- 1. Laws of thermodynamics, redox potentials, acids, bases, weak bonds, free energy, resonance, isomerisation etc.
- 2. Carbohydrate, lipid and protein classification, occurrence, their structure and functions.
- 3. Beta-oxidation and role of polyunsaturated fatty acids.
- 4. Nitrogen fixation, symbiotic and non-symbiotic

- 5. Enzymes-classification, mode of action, kinetics and Enzyme inhibition.
- 6. Structure and function of DNA, different kinds of RNA and their origin, role in protein synthesis.
- 7. Biosynthesis and functions of secondary metabolites; phenolics, flavanoids, terpenoids, alkaloids, steroids and suberins.

Course-XIV (Ecology)

- 1. Climate, Soil and Vegetation patterns and organization
- 2. Ecosystem organization: Structure and Functions, primary production and energy dynamics
- 3. Population growth and dynamics
- 4. Predator-Prey interaction, Host parasite interaction, Competition, Mutualism types and theories.
- 5. Scope, importance and management of biodiversity.
- 6. Environmental pollution types, sources and their effects on plant and animal ecosystems.
- 7. Sustainable development, sustainability indicators, degraded ecosystems and their regeneration with special reference to waste lands, forests and aquatic ecosystem.