

UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA

Department of Zoology

Program Name: M.Sc. Zoology

Program Code: MSZ

Program Outcome (PO):

1. The programme helps to develop scientific temper and attitude, beneficial for the society and make the students aware about the different biological systems, their coordination, control and evolution.
2. It helps to cater ample opportunities to explore different career avenues both in public and private sector. Practical and theoretical skills gained in this programme will be helpful in designing different public health strategies for social welfare and entrepreneurship.
3. The programme aims to inculcate among students an ethical approach towards peaceful coexistence with nature.

Program Specific Outcome (PSO):

PSO-1: Students gain knowledge and skill in the fundamentals of animal as well as understand the complex interactions among various living organisms.

PSO-2: Analyze complex interactions and their critical evaluation among and within various groups of animal phyla, their distribution and relationship with the environment.

PSO-3: Application of knowledge on the internal structure of cell, its functions in control of various metabolic functions of organism.

PSO-4: Ability to correlate the physiological processes of animals and relationship of organ systems.

PSO-5: Understand the complex evolutionary processes and behavior of animals.

PSO-6: Understanding of environmental role in conservation processes and its significance, pollution control, biodiversity and the protection of endangered species.

PSO-7: Gain knowledge on Agro based Small Scale industries like Sericulture, Lac culture, Fish culture and farming, Pearl culture etc.

PSO-8: Understands about various concepts of genetics, molecular biology leading to quantification of biological events and its importance in human health.

PSO-9: Practical application of zoological knowledge to one's own life and work, develop empathy and commit to professional ethics.

PSO-10: Generates awareness against cruelty and unnecessary killing of animals and love towards them.

PSO-11: Sensitize students in particular and society in general on the conservation of animals and habitat protection.

Course code: MSZ-101 (Theory)

Course Title: Taxonomy, Biosystematics and Biostatistics (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Deeper understanding of the principles and practice of systematics.
- CO2: Acquire an in-depth knowledge of the diversity and relationship in animal world & to develop a holistic approach towards the phylogeny and adaptation in animals.
- CO3: Understand the development and application of statistical methods to a wide range of topics in biology.
- CO4: Understand the data collection methods which are considered in research planning, because it highly influences the sample size and experimental design.

Course Code: MSZ-102 (Theory)

Course Title: Bio-instrumentation and Cell Biology (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand the basic principles of modern analytical techniques
- CO2: Get basic idea about techniques like histochemistry, microbiological techniques, hybridization techniques and polymerase chain reaction.
- CO3: Understand organization of cell and the molecular structure of biomembranes and cytoskeletons.
- CO4: Understand the cellular reproduction, cell-cell adhesion and cell-cell signaling.

Course Code: MSZ-103 (Theory)

Course Title: Animal Physiology and Endocrinology (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand physiology of digestion and respiration along with mechanism of circulatory system and musculature in vertebrate.
- CO2: Understand the physiology of excretion and thermoregulation and detailed study of structures and functioning of nervous system.
- CO3: Understand the concept, nature and mechanism of hormone action.
- CO4: Understand the structure and functioning of pituitary gland, thyroid gland, adrenal gland and pancreas.

Course Code: MSZ-104 (Practical)

Course Title: Taxonomy, Biosystematics and Animal Physiology Taxonomy, Biosystematics and Animal Physiology (4-Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Learn different methods of collection, preservation and curation of invertebrates and vertebrates and the identifying characters of various species belonging to different phylum.
- CO2: Understand application of different statistical tools like T- test, ANOVA, Pearson correlation coefficient biodiversity indices.
- CO3: Understand techniques to detect blood group and blood cell comparison in different vertebrates.
- CO4: Understand physiological experiments which help in control and coordination.

Course Code: MSZ-105 (Practical)

Course Title: Bio-instrumentation and Cell Biology and Endocrinology (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand the structural arrangement of cell membrane through model, mitotic & meiotic cell division through prepared slides
- CO2: Knowledge on preparation techniques for various fixatives & stains.

- CO3: Learn temporary preparation of mitotic & meiotic stages.
CO4: Understand the preparation & loading of Gel for Electrophoresis.
CO5: Learn to detect and estimate protein in samples.

Course Code: MSZ-201 (Theory)

Course Title: Development and Reproductive Biology (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand the basic concepts of developmental biology including modern techniques to overcome infertility.
CO2: Understand the concepts of organogenesis in invertebrates and vertebrates.
CO3: Understand the female Sexual cycles
CO4: Understand the physiology of Pregnancy

Course Code: MSZ-202 (Theory)

Course Title: Molecular Biology and Biochemistry (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand the biochemical organization of cell at molecular level including the structure and function of genetic material.
CO2: Understand transcription, post transcriptional modification and translation.
CO3: Understand the biochemistry of metabolic process.
CO4: Understand the bioenergetics of the cell and properties of enzyme.

Course Code: MSZ-203 (Theory)

Course Title: Ecology and Environmental Science (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand the structures of ecosystems and its functions.
CO2: Understand the various ecological processes and monitoring systems.
CO3: Understand and be proficient in environmental degradations and the Biogeochemical cycles, biodiversity assessment, monitoring of ecological systems.
CO4: Understand the Biodegradation, Bioremediation and Ecosystem management of Waste and Environmental Toxicology and wildlife conservation

Course Code: MSZ-204 (Practical)

Course Title: Ecology & Environmental Science and Reproductive & Developmental Biology (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand and be expertise to perform water analysis in different water source and Identify different types of Phytoplankton and Zooplankton.
CO2: Students will be expertise to test different parameters of Soil.
CO3: Understand preparation of Chick embryo, whole mount and observation of chick embryo development.
CO4: Understand of Estrous cycle in mice and reproductive system of male & female cockroach.
CO5: Grow interest in research through field visit and acquire application based knowledge.

Course Code: MSZ-205 (Practical)

Course Title: Molecular Biology and Biochemistry (4 Credits)

Course Outcome:**At the end of the course, the students will be able to:**

CO1: Understand the isolation of genomic DNA & protein.

CO2: Understand the design of tissue culture Lab., hybridoma technology.

CO3: Understand the quantitative estimation of DNA, RNA, amino acid & total protein

CO4: Understand the action of salivary amylase on carbohydrate.

Course Code: MSZ-301 (Theory)**Course Title: Genetics and Evolution (4 Credits)****Course Outcome:****At the end of the course, the students will be able to:**

CO1: Understand the concept of organization of genetic material and about microbial genetics.

CO2: Understand cell cycle, genetic disorders of human and the importance of genetic counseling and also population genetics.

CO3: Understand evolution of prokaryotes and eukaryotes along with theories and process of micro and macro evolution.

CO4: Understand about speciation, gene frequencies in population and molecular basis of evolution including origin and evolution of primates.

Course Code: MSZ-302 (Theory)**Course Title: Parasitology, Economic Zoology and Aquatic Biology (4Credits)****Course Outcome:****At the end of the course, the students will be able to:**

CO1: Acquire knowledge on various parasites and diseases and vector borne diseases- Malaria, Japanese encephalitis, Dengue and Leishmania

CO2: Have a basic idea about classification of agricultural insect pest, pest of some major crops, forest pests. Also study of economically important insects: sericulture and Lac culture.

CO3: Know concept on Aquaculture, Aquatic resources, Culture systems: Freshwater aquaculture systems: Freshwater prawn culture, fish culture in paddy fields, Brackish water culture, Mariculture: Oyster culture, Crab culture, Lobster culture, mussel culture, culture of Eels, Culture of aquatic weeds.

CO4: Understand the Composite fish culture and Preparation and management of fish culture ponds. Transport of fish seed and Brood fish and Harvesting: Fishing techniques, preservation & processing of fish and Fish pathology.

CO5: Importance of Ornamental fish culture, Cryopreservation and transgenic species, Genetic selection and Hybridization, Live gene bank

Course Code: MSZ-303A (Theory)**Course Title: Special Paper: Cell and Molecular Biology-I (4 Credits)****Course Outcome:****At the end of the course, the students will be able to:**

CO1: Understand the molecular composition of the cell membrane and understand the membrane transport mechanisms and the role of cytomembrane in health and diseases.

CO2: Understand the ultrastructure of the nucleus along with trafficking of protein.

CO3: Understand the Genomics and genome mapping.

CO4: Understand the different genome sequencing techniques and different bioinformatic tools to interpret them.

Course Code: MSZ-303B (Theory)**Course Title: Special Paper: Animal Ecology and Wildlife Biology-I (4 Credits)**

Course Outcome:**At the end of the course, the students will be able to:**

- CO1: Understand the Ecosystem cybernetics and Energy flow in Environment. Description of nature of ecosystem, production, food webs, energy flow, biogeochemical cycles, resilience of ecosystem and ecosystem management.
- CO2: Understand competition and coexistence, intra-specific and inter-specific interactions.
- CO3: Understand the management practice of rare and endangered species and captive breeding of wildlife and special management of wildlife.
- CO4: Understand the wildlife legislation, National Forest policy, National wildlife action plan, National and state biodiversity plan.

Course Code: MSZ-303C (Theory)**Course Title: Special Paper: Fish and Fishery Biology-I (4 Credits)****Course Outcome:****At the end of the course, the students will be able to:**

- CO1: Understand the anatomical system viz., skeletal, respiratory, excretory & digestive systems of teleost fishes and biochemical composition of Fish.
- CO2: Understand the fish diversity & classification of fishes from Northeast India and diversity of endangered fishes of NE India.
- CO3: Understand the various relationships between morphometric parameters & fish diversity.
- CO4: Understand the various factors associated with Inland capture fisheries.
- CO5: Understand the different aspects of fish nutrition, biochemical composition and fish food organisms.

Course Code: MSZ-303D (Theory)**Course Title: Special Paper: Entomology-I: (4 Credits)****Course Outcome:****At the end of the course, the students will be able to:**

- CO1: Understand insect body segmentation, modification and appendages
- CO2: Understand the different types of Mouth parts of insects and their food habit. Wings and flight of insects
- CO3: Understand the integument system, chemical composition chitin, cuticular protein, moulting etc.
- CO4: Understand the muscular system of insect and the application of different muscles in different activities.
- CO5: Learn about insect vision, Mechanoreceptors, Chemoreceptors, Thermohygro receptors and Mechanical communication with other organisms and embryonic development.
- CO6: Understand insect endocrine glands, endocrine system and function, the hormones used in pest control and ectohormones
- CO7: Understand modern scheme of insect classification.

Course Code: MSZ-303E (Theory)**Course Title: Special Paper: Animal Physiology and Biochemistry-I (4 Credits)****Course Outcome:****At the end of the course, the students will be able to:**

- CO1. Explain the free energy involved in the biological systems, its generation and utilization.
- CO2. Assess the modern concept of various structural patterns of protein molecules and their processing in the cell.
- CO3. Compose the mathematical approach (Kinetics) of enzyme actions as well as the common pathway of metabolism of complex food molecules in human body.
- CO4. Analyze the mechanism by which different systems in the body, like digestion, respiration, excretion,

circulation, neuromuscular and sensory processes work in the body and their regulation.

Course Code: MSZ-304 (Practical)

Course Title: Genetics and Evolution; Parasitology, Economic Entomology and Aquatic Biology (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Study of insect diversity and identification of mammalian parasites, insect pest, ornamental and hill stream fishes of N.E. India.

CO2: Learn about the structure and significance of pituitary gland in fishes.

CO3: Gain knowledge about fishery management techniques through field visit.

CO4: Learn about methods of determining the different hydrobiological parameters.

Course Code: MSZ-305A (Practical)

Course Title: Special Paper: Cell and Molecular Biology-I (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Prepare of culture medium for Protozoa & Drosophila

CO2: Learn identification and classification of Protozoa, types of Protozoa & Drosophila found locally.

CO3: To understand the different stages of cell division of mitosis & study the effect of Colchicines in mitosis.

CO4: Isolate & separate of DNA from tissue samples.

CO5: Isolate of protein samples from tissue sample and its separation of protein.

Course Code: MSZ-305B (Practical)

Course Title: Special Paper: Animal Ecology and Wildlife Biology-I (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Learn the morphological characters of Birds, Lizards, Frogs and Turtles.

CO2: Use Diversity Index like Shannon-Wiener, Community Dominance, Similarity and Dissimilarity Index.

CO3: Understand concept of the niche; introduction and definition of niche, parameters of niche and factors affecting it. Niche separation and overlap. Measures of niche width.

CO4: Understand and be able to do wildlife practical on Activity budgeting, Line and Point transects.

CO5: Know use of Ecological Instruments like GPS, Altimeter, Lux meter, Radiocollar, Camera.

Course Code: MSZ-305C (Practical)

Course Title: Special Paper: Fish and Fishery Biology-I (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Understand the identification & classification of common local fresh water fishes.

CO2: Know about the accessory respiratory organs of fishes through dissection.

CO3: Understand the location & significance of Weberian ossicle of teleost fishes

CO4: Understand the haematological parameters of fishes.

CO5: Get idea about local fishing gears used by fish farmers using traditional methods for fish harvesting.

Course Code: MSZ-305D (Practical)

Course Title: Special Paper: Entomology-I (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: To demonstrate the different mouth parts of insects, so that students will understand the food habit of insects.
- CO2: Identify different types of legs, antennae, wings so that students will understand the morphological characters of insects.
- CO3: Make permanent slide of stored grain pest and sting apparatus of honey bee and of arolium, empodium and pollen basket to understand the specific functions of them.
- CO4: Prepare slides to identify different types of Haemocytes.
- CO5: Detect Urease and Chitin.
- CO6: Get knowledge about the insect collecting devices, methods of insect collection and preservation and collection of insect pest.
- CO7: Know about economically important insects.

Course Code: MSZ-305E (Practical)

Course Title: Special Paper: Animal Physiology and Biochemistry-I (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Know to determine the chemical constituents of mammalian urine.
- CO2: Acquire the skills of determination of total proteins, amino acids, lipids and fatty acids in the tissues.
- CO3: Investigate how the enzymes activity is affected by the Physiochemical factors like temperature, pH, activators and inhibitors.
- CO4: Acquire the skill to examine milk by estimating its fat content.
- CO5: Develop expertise on histochemical techniques.
- CO6: Construct LB plot for K_i determination of enzymes.

Course Code: MSZ-306 (Theory)

Course Title: Bio-resource and Wildlife Management (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand about the different natural resources and conservation importance.
- CO2: Know the different forest types and its management practices
- CO3: Understand the concept on wildlife and different census techniques
- CO4: Understand the different methods of wildlife conservation.

Course Code: MSZ-401 (Theory)

Course Title: Immunology, Bioinformatics and Research Methodology (4 Credits) Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand of different types of immunity. Interactions of antigens, antibodies, complements and other immune components along with immune mechanisms in disease control, process of immune interactions. Outline the key components of the innate and adaptive immune responses.
- CO2: Learn about cell types and organs which are involved in an immune response, hypersensitivity, autoimmune disorders, vaccination and immunodeficiency diseases.
- CO3: Understand Genbank, UCSC, ENSEMBL, EMBL, DDBJ, protein sequence databases: Swissprot, PDB, BLAST, PSI-BLAST (steps involved in use and interpretation of results) and HMMER, BLAST vs FASTA, file formats- FASTA, GCG and Clustal W.
- CO4: Understand the different types of Research and research processes (reading, evaluating, and developing); Perform literature reviews using print and online databases; Identify, explain, compare, and prepare the key elements of a research proposal/report; Compare

and contrast quantitative and qualitative research.

Course Code: MSZ-402A (Theory)

Course Title: Special Paper: Cell and Molecular Biology-II (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand the action mechanism of primary receptors in cell system and understand the signaling pathway of different types of 2nd messenger along with the structure & dynamics of cytoskeletal structures and cell motility.
- CO2: Understand the difference between cancer cells & normal cell and the intrinsic & extrinsic mechanism of programmed cell death.
- CO3: Understand the various Molecular Cytogenetic Technique.
- CO4: Understand the different cloning methodologies with their scope & significance.

Course Code: MSZ-402B (Theory)

Course Title: Special Paper: Ecology and Wildlife Biology-II (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand the Ecology of Island Biogeography Relation of Island factor, Gap Dynamics, Gap formation in Forest and the Environmental monitoring and management, Restoration of Ecology.
- CO2: Understand the Habitat selection in animals, Kin Selection, Predator–prey interactions, Social system of Mammals.
- CO3: Understand the Man and wildlife issues, Eco development, and Community participation in wildlife management, Human-wildlife conflict cases, Wildlife diseases, Wildlife trade and its preventive measures.
- CO4: Understand the skills of habitat assessment and animal monitoring. To understand animal behavior and the different tools & techniques use for animal survey & census.

Course Code: MSZ-402C (Theory)

Course Title: Special Paper: Fish and Fishery Biology-II (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

- CO1: Understand the different system of freshwater aquaculture–monoculture, composite pisciculture, sewage fed fish culture, raft, raceway, pen and cage culture, and paddy cum fish culture; extensive, intensive, semi-intensive and traditional system of fish farming and the management aspect of fish ponds (Nursery, rearing and stocking ponds). Pre and post stocking management of nursery pond.
- CO2: Understand the importance of Air breathing fish and its importance in fishery and the different Fisheries Technology in north east India.
- CO3: Understand the Economic importance of fish and fishery in relation to human health and the Exotic fish culture: selection of species, invasive species and its impact on natural fisheries.
- CO4: Understand the concept of management of fishery: Fish health management: and Fish environment and the Principles and method of processing and preservation of fish by refrigeration and freezing, drying, salting, canning, smoking and pickling.
- CO5: Understand the Fish by products and their economic importance and the Fish

endocrinology, reproduction, genetics and biotechnology.

Course Code: MSZ-402D (Theory)

Course Title: Special Paper: Entomology-II: (4Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Understand the physiology of digestion, respiration and circulation in insects.

CO2: Understand the physiology of excretion, detailed structure and function of nervous system and reproduction of insects along with different types of reproduction.

CO3: Understand the classification of pest, pest of Medical importance and Forest pest and the mechanism of pest Control and the importance of Biological pest control.

CO4: Understand innate immunity and insect resistance

CO5: Understand the concept of Forensic Entomology.

Course Code: MSZ-402E (Theory)

Course Title: Special Paper: Animal Physiology and Biochemistry-II (4 Credits)Course Outcome:

At the end of the course, the students will be able to:

CO1: Make them update with recent information about the techniques related with molecular engineering and manipulations like cloning of DNA/RNA, cDNA library, PCR, RIA, Cell culture etc.

CO2: Able to inspect the way by which hormones in the body have their synthesis, release and action inside the target cells and also certain vital aspects of reproductive biology like placenta and contraceptives.

CO3: Design physiologically the stress and adaptations in relation to environment.

CO4: Have critical analysis on internal body defense mechanism and its link with diseases of human body.

CO5: Develop theoretical knowledge about the use of body fluids including enzymes in diagnosis purposes.

Course Code: MSZ-403 (Practical)

Course Title: Immunology, Bioinformatics and Research Methodology (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Understand the histology of primary and secondary lymphoid organs.

CO2: Separate Lymphocytes and serum from blood.

CO3: Understand antigen-antibody interaction.

CO4: Use Software for database preparation and Extract data from specific databases using accessions numbers, gene names etc. Use selected tools at NCBI and EBI to run simple analyses on genomic sequences.

CO3: Perform literature reviews using print and online databases.

Course Code: MSZ-404A (Practical)

Course Title: Special Paper: Cell and Molecular Biology-II (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Identify the various types of cancer cells through permanent mounting.

CO2: Use the cytological staining technique of Mitochondria & Golgi bodies and tounderstand the technique of supra vital staining of cells.

CO3: Apply the histochemical staining of Protein & DNA.

CO4: Perform extraction & separation of genomic DNA.

CO5: Understand the working mechanism of PCR.

Course Code: MSZ-404B (Practical)

Course Title: Special Paper: Animal Ecology and Wildlife Biology-II (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Understand the ecological processes.

CO2: Use of Instruments/Equipments on field and inside the Laboratory.

CO3: Understand the wildlife diversity by using different census/survey methods.

CO4: Understand to measure the Niche Breadth and Niche Separation by Levin's measure, Mac Arthur Measure, Bray and Curtis Method

Course Code: MSZ-404C (Practical)

Course Title: Special Paper: Fish and Fish Biology-II (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Understand the various physiochemical parameters of water with respect to fish biology

CO2: Understand the age determining technique in fishes.

CO3: Analyze the haematological parameters in fishes.

CO4: Analyze the fish population estimation & its fecundity and the feeding habit of fishes and plankton analysis.

CO5: Understand the various designs of fish farm/hatcheries & their significance.

Course Code: MSZ-404D (Practical)

Course Title: Special Paper: Entomology-II: (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Understand nervous system, reproductive system and salivary gland of Cockroach with the help of dissection.

CO2: Learn about the salivary gland (Pharyngeal, labial and thoracic) and sting apparatus of Honey bee with the help of dissection and mounting on the slide.

CO3: Have knowledge about alimentary canal of housefly and bacterial chamber of termites to understand the importance of insect digestion process.

CO4: Prepare microscopic slide of Hepatic caeca and malpighian tubules of cockroach to demonstrate excretory mechanism.

CO5: Understand the Histology of eggs, cleavage, blastula, gastrula, testis, ovary of insect through permanent slides.

CO6: Experience Field observation for identification, collection & understanding of damage done by agricultural crop pests

CO7: Perform Biochemical experiments on trehalase activity, amino acid in hemolymph and LD₅₀ values for major insect pest.

Course Code: 404E (Practical)

Course Title: Special Paper: Animal Physiology and Biochemistry-II (4 Credits)

Course Outcome

At the end of the course, the students will be able to:

CO1: Acquire the skill of determining reproductive cycle stages in female and sperm count and motility in male mice.

CO2: Have expertise on SDS-PAGE, RTPCR and ELISA.

CO3: Have skill to detect and to identify histological structures of various endocrine

glands.

CO4: Learn the technique of studying lymphoid tissues and lymphocytes together with certain immune reactions.

CO5: Examine glucose tolerance and insulin tolerance in diabetic animals.

Course code: MSZ - 405

Course Title: Dissertation (4 Credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Have clear understanding of the concept of Research.

CO2: Develop idea of preparation of method and methodology for a research work to detect the future field of interest so that the students can extend their Research work for PhD.

CO3: Acquire the skill of statistical analysis of Data.

CO4: Expand Research work from the level of classroom to the field & laboratories.

CO5: Formulate a research proposal and to generate innovative thinking.

Course code: MSZ-406

Course Title: Economic Zoology (4 credits)

Course Outcome:

At the end of the course, the students will be able to:

CO1: Able to acquire knowledge on economically important insects and rearing: of Silkworm, Honey bee and Lac insect.

CO2: Know concept on Aquaculture, Composite fish culture, integrated fish farming and Ornamental fish of NE India

CO3: Have a basic idea about insect pests affecting agricultural crop, forest insect pest, stored grain pest and pesticidal hazards.

CO4: Acquire knowledge on various parasites and diseases and vector borne diseases- Malaria, Japanese encephalitis, Dengue