

Dept. of Zoology, Bankura Sammilani College

MODULE BREAKUP OF THE SYLLABUS

SESSION 2022-23

CLASS : Sem-I (Zoology Honours)

(Theory Paper : Core T1 and Core T2)

Month	Topic
July – August - September	<p>Non-chordates I: Protista to Pseudocoelomates</p> <p>1 Definitions: Classification, Systematics and Taxonomy: Taxonomic Hierarchy, Taxonomic types, Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Six kingdom concept of classification (Carl Woese) Unitary and Modular populations, Population: Characteristics, growth forms, and regulation of population density, Nematoda</p> <p>2. Life cycle, and pathogenicity and control measures of <i>Ascaris lumbricoides</i> and <i>Wuchereria bancrofti</i>, Parasitic adaptations in helminthes</p> <p>3. General characteristics and Classification up to phylum (according to Levine et. al., 1981). Porifera General characteristics and Classification up to classes (Hyman); Locomotion in <i>Euglena</i>, <i>Paramoecium</i> and <i>Amoeba</i>; Conjugation in <i>Paramoecium</i>. Life cycle and pathogenicity of <i>Plasmodium vivax</i> and</p> <p>4. Cnidaria</p> <p>a) General characteristics and Classification up to classes</p> <p>b) Metagenesis in <i>Obelia</i> & <i>Aurelia</i></p> <p>c) Polymorphism in Cnidaria</p> <p>5. Life cycle and pathogenicity and control measures of <i>Fasciola hepatica</i> Canal system of sponge ,Evolution of symmetry and segmentation of Metazoa.</p> <p>Ecology</p> <p>1. History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors.</p>

**October – November -
December**

Non-chordates I: Protista to Pseudocoelomates

1. Spicules in sponges,
2. Ctenophora General characteristics.
3. Platyhelminthes. General characteristics and Classification up to classes.
4. Corals and coral reef diversity, function & conservation.
5. Life cycle and measures of *Taenia solium*, *Entamoeba histolytica*.

Ecology

1. Types of ecosystem with an example, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web.
2. Community characteristics: species diversity, abundance,, dominance, richness, Concept of community stratification, Ecotone and edge effect. Ecological succession with one example.
3. Wildlife Conservation (in-situ and ex-situ conservation). Management strategies for tiger conservation; Wild life protection act (1972), Study of Physical factors,
4. The Biosphere. Geometric, exponential and logistic growth, equation and patterns, r and K strategies
5. Population regulation - density-dependent and independent factors,Population Interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition.
6. Biogeochemical cycle with an example of Human modified forest ecosystem.
7. Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies.

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(Practical Paper : Core P1 and Core P2)

Month	Topic
July – August - September	<p>1. Identification of following specimen</p> <p>a. <i>Amoeba, Euglena, Entamoeba, Opalina, Paramecium, Plasmodium,</i></p> <p>b. <i>Sycon, Neptune's Cup, Fasciola, Taenia and Ascaris</i></p> <p>c. <i>Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia, Metridium, Pennatula, Fungia, Madrepora.</i></p> <p>1. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Weiner diversity index for the same community</p> <p>2. Study of an aquatic ecosystem: Zooplankton, Measurement of turbidity/penetration of light, determination of pH,</p>
October – November - December	<p>. Whole mount preparation of <i>Euglena, Amoeba, and Paramecium.</i></p> <p>3. Staining and mounting of any protozoa/helminth from gut of cockroach.</p> <p>4. Submission of Laboratory Note Book</p> <p>and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO₂</p> <p>3. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary</p> <p>4. Submission of Laboratory Note Book</p>

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MODULE BREAKUP OF THE SYLLABUS

SESSION 2022-23

CLASS: Sem-III (Zoology Honours)

(Theory Paper: Core T5, Core T6 and Core T7)

Month	Topic
July – August- September	<p>Mammals</p> <ol style="list-style-type: none">1. General characters and classification up to living orders2. Affinities of Monotremata3. Exoskeleton derivatives of mammals4. Adaptive radiation in mammals with reference to locomotory appendages5. Echolocation in Micro chiropterans and Cetaceans <p>Zoogeography</p> <p>Zoogeographical realms, Plate tectonic and Continental drift theory, distribution of birds and mammals in different realms</p> <p>Amphibia</p> <ol style="list-style-type: none">1. General characteristics and classification up to living Orders.2. Metamorphosis and parental care in Amphibia. <p>Endocrine System</p> <ol style="list-style-type: none">1. Histology and function of pituitary, thyroid, pancreas and adrenal2. Classification of hormones; Mechanism of Hormone action3. Signal transduction pathways for Steroidal and Non steroidal hormones in brief4. Placental hormones <p>Lipids</p> <ol style="list-style-type: none">1. Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpenoids.2. Lipid metabolism: β-oxidation of fatty acids <p>Tissues</p> <p>Classification, structure and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue.</p> <p>Proteins</p> <ol style="list-style-type: none">1. Amino acids: Structure, Classification, General and Electro chemical properties of α-amino acids; Physiological importance of essential and non-essential amino acids <p>Proteins: Bonds stabilizing protein structure; Levels of organization</p> <p>Reptilia</p>

	<p>1. General characteristics and classification up to living Orders. 2. Poison apparatus and Biting mechanism in Snake.</p> <p>Aves</p> <p>1. General characteristics and classification up to Sub-Classes 2. Exoskeleton and migration in Birds 3. Principles and aerodynamics of flight.</p> <p>Introduction to Chordates Concept of Phylum Chordata</p> <p>Protochordata</p> <p>1. General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. 2. Retrogressive metamorphosis in Ascidia. 3. Chordate Features and Feeding in Branchiostoma</p>
<p>October – November - December</p>	<p>Bone and Cartilage Structure and types of bones and cartilages</p> <p>Muscular system Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle fibre</p> <p>Proteins Fate of C-skeleton of Glucogenic and Ketogenic amino acids</p> <p>Enzymes Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Michaelis-Menten equation, Lineweaver-Burk plot; Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition; Allosteric enzymes and their kinetics</p> <p>Reproductive System Histology of testis and ovary Physiology of Reproduction</p> <p>Carbohydrates</p> <p>1. Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides: Derivatives of Monosachharides 2. Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis</p> <p>Oxidative Phosphorylation in mitochondrial matrix Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System</p> <p>Proteins</p>

Protein metabolism: Transamination, Deamination, Urea cycle

Nucleic Acids

1. Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids
2. Types of DNA and RNA, Complementarity of DNA, Hypo-Hyperchromaticity of DNA
3. Basic concept of nucleotide metabolism

Nervous System

Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse. Synaptic transmission and Neuromuscular junction

Origin of Chordata

1. Dipleurula concept and the Echinoderm theory of origin of chordates
2. Advanced features of vertebrates over Protochordata

Agnatha

General characteristics and classification of cyclostomes up to order

Pisces

1. General characteristics and classification of Chondrichthyes and Osteichthyes up to Subclasses
2. Accessory respiratory organ, migration and parental care in fishes
3. Swim bladder in fishes.

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MODULE BREAKUP OF THE SYLLABUS
CLASS: Sem-III (Zoology Honours)
(Practical Paper: Core P5, Core P6 and Core P7)

Month	Topic
July – August- September	<p>Identification of following specimen.</p> <ol style="list-style-type: none"> 1. Protochordata: Balanoglossus, Herdmania, Branchiostoma 2. Agnatha : Petromyzon, Myxine 3. Fishes: Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetradon/ Diodon, Anabas, Flat fish 4. Amphibia: Necturus, Bufo, Hyla, Alytes, Axolotl, Tylototriton 5. Recording of computer aided simple muscle twitch with electrical stimulation (or Virtual) 6. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells 7. Qualitative tests of functional groups in carbohydrates, proteins and lipids. 8. Quantitative estimation of Lowry Method
October – November - December	<p>Identification of following specimen.</p> <ol style="list-style-type: none"> 1.Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus. Key for Identification of poisonous and non-poisonous snakes 2. Mammalia: Bat (Insectivorous and Frugivorous), Funambulus 3. Pecten from Fowl head 4. Dissection of brain and pituitary of Tilapia 5. Power point presentation on study of any two animals from two different classes by students (may be included if dissections not given permission) 6. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid 7. Microtomy: Preparation of permanent slide of any five mammalian (Goat/white rat) tissues. 8. To study the enzymatic activity of Trypsin and Lipase. 9. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.

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MODULE BREAKUP OF THE SYLLABUS

SESSION 2022-23

CLASS: SEM V (Zoology Honours)

(Theory Paper: Core T11, Core T12, DSE T1 and DSE T2)

Month	Topic
<p>July – August - September</p>	<p>Core T12: Principles of Genetics</p> <p>1. Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example of each), Non-disjunction and variation in chromosome number; Molecular basis of mutations in relation to UV light and chemical mutagens.</p> <p>DSE T2: Biology of Insecta</p> <p>1. Basis of insect classification; Classification of insects up to orders (according to Ruppert and Barnes)</p> <p>2. External Features; Head - Eyes, Types of antennae, Mouth parts w.r.t. feeding habits</p> <p>3 Core T11: Molecular Biology</p> <p>1. Emergence, Historical growth of the discipline and scope</p> <p>2. Salient features of DNA and RNA Watson and Crick Model of DNA</p> <p>3. Basic concept of PCR, Western and Southern blot, Northern Blot</p> <p>Core T12: Principles of Genetics</p> <p>1. History of Genetics and its scope; Principles of inheritance; Incomplete dominance and co-dominance; Epistasis Multiple alleles; Lethal alleles; Pleiotropy; sex-linked, sex- influenced and sex-limited inheritance; Polygenic Inheritance.</p> <p>2. Conjugation, Transformation, Transduction, Complementation test in Bacteriophage.</p> <p>Core T11: Molecular Biology</p> <p>1. Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres</p> <p>2. Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.</p>

	<p>DSE T2: Biology of Insecta</p> <ol style="list-style-type: none"> 1. Social insects with special reference to termites 2. Trophallaxis in social insects such as ants 3. Theory of co-evolution; role of allelochemicals in host plant mediation; Host-plant selection by phytophagous insects <p>DSE T1: Animal Behaviour and Chronobiology</p> <p>Types and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; Circannual rhythms; Concept of synchronization and masking; Photic and non-photic zeitgebers; Photoperiod and regulation of seasonal reproduction of vertebrates; Role of melatonin and serotonin</p>
<p>October – November - December</p>	<p>Core T12: Principles of Genetics</p> <ol style="list-style-type: none"> 1. Linkage and Crossing Over; molecular basis of crossing over; Measuring recombination frequency and linkage intensity using three- factor crosses; Interference and coincidence 2. Criteria for extra chromosomal inheritance, Antibiotic resistance in Chlamydomonas, 3. Kappa particle in Paramecium 4. Shell spiralling in snail. <p>DSE T1: Animal Behaviour and Chronobiology</p> <ol style="list-style-type: none"> 1. Biological oscillation; Adaptive significance of biological clocks 2. Social Behaviour: Concept of Society; various modes of animal communication 3. Altruism; Insects' society with Honey bee as example; Foraging in honey bee and the waggle dance. <p>DSE T1: Animal Behaviour and Chronobiology</p> <ol style="list-style-type: none"> 1. Origin and history of Ethology, Proximate and ultimate causes of behaviour, Methods and recording of a behaviour; Role of behaviour in conservation biology 2. Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care.

	<p>Core T11: Molecular Biology</p> <p>Mechanism of protein synthesis in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation</p> <p>DSE T1: Animal Behaviour and Chronobiology</p> <p>1. Stereotyped Behaviours (Orientation, Reflexes); Individual Behavioural patterns; Instinct vs. Learned Behaviour; Associative learning, classical - and operant conditioning, Habituation, Imprinting.</p> <p>DSE T2: Biology of Insecta</p> <p>1. General Features of Insects; Success of Insects on the Earth; Role of insect in human welfare. Thorax: Wings and wing articulation, Types of Legs adapted to diverse habitat ; spiracles and genitalia</p> <p>4. Structure and physiology of Insect - Integumentary, digestive, excretory, circulatory, respiratory, endocrine, reproductive, and nervous system</p> <p>5. Photoreceptors: Types, Structure and Function</p> <p>6. Types of metamorphosis along with neuroendocrine control</p> <p>7. Brief discussion on Diptera as a carrier of disease and control</p>
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MODULE BREAKUP OF THE SYLLABUS

SESSION 2022-23 CLASS : Sem-V (Zoology Honours)

(Practical Paper : Core T11, Core T12, DSE T1 and DSE T2)

Month	Topic
July – August - September	<p>1. Study and interpretation of electron micrograph/photograph showing</p> <p>a. Lampbrush chromosome</p> <p>b. DNA replication</p> <p>c. Transcription</p> <p>d. Split gene</p>

	<ol style="list-style-type: none"> 2. Identification of chromosomal aberration in <i>Drosophila</i> (inversion, ring chromosome, paracentric inversion) and man (Normal karyotype, Down, Klinefelter's, Turner, Cri-du-Chat syndrome) from photograph 3. Chi-square analyses 4. Linkage maps based on <i>Drosophila</i> crosses 5. Study of nests and nesting habits of the birds and social insects. 6. Study of the behavioural responses of wood lice to dry and humid conditions. 7. Study of geotaxis behaviour in earthworm. 8. Study of the phototaxis behaviour in insect larvae. 9. Identification of life cycle of Mosquito 10. Identification of different kinds of antennae, legs and mouth parts of insects (Cockroach, Praying Mantis, Mosquito) 11. Mounting of wings, larval spiracles and genitalia of any insects (House Fly) 12. Methodology of collection, preservation of insects.
<p style="text-align: center;">October – November - December</p>	<ol style="list-style-type: none"> 1. Pedigree analysis of some human inherited traits. 2. Demonstration of techniques of handling <i>Drosophila</i>, identifying males and females; observing wild type and mutant flies (slide/photograph), and setting up cultures 4. Preparation of polytene chromosome from <i>Chironomus</i> or <i>Drosophila</i> larva 5. Preparation of solid culture media (LB) and growth of <i>E.coli</i> by spreading and Streaking methods 6. Study of circadian functions in humans (daily eating, sleep and temperature patterns). 7. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report 8. Project report: morphological studies of various castes of <i>Apis sp</i>, <i>Camponotus sp</i>, <i>Odontotermes sp</i> 9. Identification of any three major insect pests of paddy (<i>Scirpophaga</i>, <i>Leptocoriza</i>, and <i>Hispa</i>) and their damages 10. Identification of Mulberry silk moth (life cycle stages) 11. Submission of Laboratory Note Book.