

# Academic Calendar

## Department of Zoology, HMMCW

### July, 2023- December, 2023

A. WBSU- NEP Syllabus

B. WBSU-CBCS Syllabus

Semester/ Year	A. WBSU- NEP SYLLABUS	No. of Lecture	Teacher Name	Distribution Tentative
<b>SEM-I HONOURS</b>	<b>DS-I: Non-Chordates I</b>	<b>45</b>		
	<b>Unit 1: General introduction to Protista and Metazoa</b> General characteristics and Classification of Protozoa up to phylum (Levine, 1980) General characteristics Amoeba, Paramoecium and Euglena Life cycle and pathogenicity of Entamoeba histolytica, Plasmodium vivax, Giardia intestinalis and Leishmania donovani Locomotion and Reproduction in Protista (Amoeba, Paramoecium and Euglena) Evolution of symmetry and segmentation of Metazoa	<b>15</b>	Dr. Indrajit Biswas	<b>July'23- October'23</b>
	<b>Unit 2: Porifera</b> General characteristics and Classification up to classes Canal system and spicules in sponges	<b>6</b>	Santanu Das	<b>July'23- September'23</b>
	<b>Unit 3: Cnidaria</b> General organization and Classification up to classes Metagenesis in Obelia Polymorphism in Cnidaria Corals and coral reefs: types, formation, distribution, conservation significance	<b>5</b>	Rituparna Maity	<b>July'23- October'23</b>
	<b>Unit 4: Ctenophora</b> General characteristics and evolutionary significance	<b>3</b>	Santanu Das	<b>August'23- October'23</b>
	<b>Unit 5: Platyhelminthes</b> General characteristics and Classification up to classes, Life cycle and pathogenicity of <i>Fasciola hepatica</i> and <i>Taenia solium</i>	<b>6</b>	Dr. S. Rehan Ahmad	<b>July'23- September'23</b>
	<b>Unit 6: Nemathelminthes</b> General characteristics and Classification up to classes, Life cycle, and pathogenicity of <i>Ascaris lumbricoides</i> , and <i>Wuchereria bancrofti</i> Parasitic adaptations in helminths Origin and evolution of parasitic helminths	<b>10</b>	Dr. Anindya Sundar Bhunia	<b>June'23- October'23</b>  <b>June'23-July'23</b>

	<b>DS-I: Non-Chordates I</b>	<b>30</b>	Dr. Indrajit Biswas Rituparna Maity	<b>Acc. To Revised Syllabus 90% completed by end of November</b>
	Study of whole mount of <i>Amoeba</i> , <i>Paramoecium</i> and <i>Euglena</i> , Binary fission and Conjugation in <i>Paramoecium</i>	<b>NA</b>		
	Examination of pond water collected from different places for protistan diversity.	<b>NA</b>		
	Study of Sycon (T.S. and L.S.), Hyalonema, Euplectella, Spongilla	<b>NA</b>		
	Study of Obelia, Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia, Metridium, Pennatula, Fungia, Meandrina, Madrepora	<b>NA</b>		
	One specimen/slide of any Ctenophore	<b>NA</b>		
	Study of adult Fasciola hepatica, Taenia solium	<b>NA</b>		
	Study of adult male and female Ascaris lumbricoides	<b>NA</b>		
<b>SEM-I GENERAL</b>	<b>ANIMAL DIVERSITY</b>			
	<b>Unit-1 Kingdom Protista</b> General characters and classification of Subkingdom Protozoa up to Phylum (Levine et al., 1980)		Dr. Indrajit Biswas	<b>July'23</b>
	<b>Unit-2 Phylum Porifera</b> General character and classification up to classes; Canal System in Sycon		Dr. Indrajit Biswas	<b>August'23</b>
	<b>Unit-3 Phylum Cnidaria</b> General characters and classification up to classes		Dr. Indrajit Biswas	<b>September'23</b>
	<b>Unit-4 Phylum Platyhelminthes</b> General characters and classification up to classes; Life history of Taenia solium		Dr. Anindya Sundar Bhunia	<b>July'23</b>
	<b>Unit-5 Phylum Nematoda</b> General characters and classification up to classes; Life history of Ascaris lumbricoides		Dr. Anindya Sundar Bhunia	<b>August'23</b>
	<b>Unit-6 Phylum Annelida</b> General characters and classification up to classes		Dr. Anindya Sundar Bhunia	<b>September'23</b>
	<b>Unit 7 Phylum Arthropoda</b> General characters and classification up to classes Metamorphosis in Insects		Santanu Das	<b>July-August'23</b>

<b>Unit-8 Phylum Mollusca</b> General characters and classification up to classes; Respiration in Pila		Santanu Das	September-October'23
<b>Unit-9 Phylum Echinodermata</b> General characters and classification up to classes; Water-vascular system in Asterias		Rituparna Maity	July-August'23
<b>Unit-10 Protochordates</b> General features		Rituparna Maity	September'23
<b>Unit-11 Agnatha</b> General features and classification up to classes (Young,1981)		Rituparna Maity	September-October'23
<b>Unit-12 Pisces</b> General features and Classification up to Subclasses (Romer, 1959); Osmoregulation in Fishes		Dr. Rehan Ahmad	July'23
<b>Unit-13 Amphibia</b> General features and Classification up to living orders (Duellman & Trueb, 1986); Metamorphosis in Toad		Dr. Rehan Ahmad	August'23
<b>Unit-14 Reptiles</b> General features and Classification up to living Subclass (Young, 1981); Poisonous and non-poisonous snakes		Dr. Rehan Ahmad	September'23
<b>Unit-15 Aves</b> General features and Classification up to orders (Young, 1981); Flight adaptations in birds		Dr. Rehan Ahmad	October'23
<b>Unit-16 Mammals</b> Classification up to Subclasses (Young, 1981)		Dr. Rehan Ahmad	November'23
<b>ANIMAL DIVERSITY LAB.</b>		Dr. Anindya Sundar Bhunia Santanu Das	90% will be completed on December'23

<b>SEM-III HONOURS</b>	<b>B. WBSU-CBCS Syllabus</b>	<b>60</b>		
	<b>CHORDATES</b>			
	<b>PAPER CODE: ZOOACOR05T</b>			
	<b>Unit 1: Introduction to Chordates</b> General characteristics and outline classification of Phylum Chordata	<b>4</b>	Santanu Das	September'23- September'23
	<b>Unit 2: Protochordata</b> General characteristics and classification of sub phylum Urochordata and Cephalochordata up to Classes. Metamorphosis in Ascidia Chordate Features and Feeding in Branchiostoma	<b>8</b>	Santanu Das	September'23- October'23
	<b>Unit 3: Origin of Chordata</b> Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata	<b>5</b>	Dr. Indrajit Biswas	October'23- October'23
	<b>Unit 4: Agnatha</b> General characteristics and classification of cyclostomes up to order	<b>2</b>	Dr. Indrajit Biswas	November'23
	<b>Unit 5: Pisces</b> General characteristics and classification of Chondrichthyes and Osteichthyes up to Subclasses Accessory respiratory organ, Advanced features of vertebrates over Protochordata, migration and parental care in fishes Swim bladder in fishes. Classification up to Sub- Classes	<b>10</b>	Rituparna Maity	November'23- October'23
	<b>Unit 6: Amphibia</b> General characteristics and classification up to living Orders Metamorphosis with parental care	<b>5</b>	Rituparna Maity	September'23- September'23
<b>Unit 7: Reptilia</b> General characteristics and classification up to living Orders Poison apparatus and Biting mechanism in Snake	<b>7</b>	Dr. Anindya Sundar Bhunia	September'23- October'23	
<b>Unit 8: Aves</b> General characteristics and classification up to Sub Classes, Exoskeleton and migration in Birds, Principles and aerodynamics of flight	<b>7</b>	Dr. Anindya Sundar Bhunia	October'23- November'23	

	<b>Unit 9: Mammals</b> General characters and classification up to living orders, Phylogenetic significance of Prototheria Exoskeleton derivatives of mammals, Adaptive radiation in mammals with referenceto locomotory appendages Echolocation in Microchiropteransand Cetaceans	<b>10</b>	Dr. S Rehan Ahmad	September"23- November"23-
--	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------	-------------------------	-------------------------------

DEPARTMENT OF ZOOLOGY

<b>Unit 10: Zoogeography</b> Zoogeographical realms, Plate tectonic and Continental drift theory, Distribution of birds and mammals in different realms	<b>2</b>	Dr. S Rehan Ahmad	January'22 (1 <sup>st</sup> week)
<b>CHORDATES LAB</b> <b>PAPER CODE: ZOOACOR05P</b>	<b>60</b>	Santanu Das	Acc. To Revised Syllabus 90% completed by end of November
<b>PHYSIOLOGY</b> <b>PAPER CODE: ZOOACOR06T</b>	<b>60</b>		
<b>Unit 1: Tissues</b> Structure, locations, classification and functions of epithelial tissues, connective tissues, muscular tissues and nerve tissues	<b>10</b>	Dr. Indrajit Biswas	September'23- July20
<b>Unit 2: Bone and Cartilage</b> Structure and types of bones and cartilages, Ossification	<b>5</b>	Dr. Indrajit Biswas	October'23- November'23
<b>Unit 3: Nervous System</b> 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, Reflex action and its types	<b>15</b>	Dr. Indrajit Biswas	November'23- November'23
<b>Unit 4: Muscular system</b> Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction, Characteristics of muscle fiber	<b>10</b>	Santanu Das	September'23- October'23
<b>Unit 5: Reproductive System</b> Histology of testis and ovary; Physiology of Reproduction	<b>5</b>	Dr. Rehan Ahmad	November'23- september'23
<b>Unit 6: Endocrine System</b> Histology and function of pituitary, thyroid, Pancreas, and adrenal. Classification of hormones; Mechanism of Hormone action; Signal transduction pathways for Steroidal and Non-steroidal hormones; Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system; Placental hormones	<b>15</b>	Dr. Anindya Sundar Bhunia	September'23- December'23 (1 <sup>st</sup> Week)

<p align="center"><b>PHYSIOLOGY LAB</b> <b>PAPER CODE: ZOOACOR06T</b></p>	<p align="center"><b>60</b></p>	<p>Rituparna Maity</p>	<p>Acc. To Revised Syllabus 90% completed by end of December</p>
<p align="center"><b>BIOCHEMISTRY</b> <b>PAPER CODE: ZOOACOR07T</b></p>	<p align="center"><b>60</b></p>		
<p><b>Unit 1: Fundamentals of biochemical reactions and metabolism</b> Ionization of water, weak acids and bases, buffering and pH changes in living systems, Metabolism: Catabolism and Anabolism, Compartmentalization of metabolic pathways Shuttle systems and membrane transporters; ATP as "Energy Currency of cell"; coupled reactions; Use of reducing equivalents and cofactors; Intermediary metabolism and regulatory mechanisms</p>	<p align="center"><b>10</b></p>	<p>Dr. Anindya Sundar Bhunia</p>	<p>September'23- October'23</p>
<p><b>Unit 2: Carbohydrates</b> Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosachharides, Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis</p>	<p align="center"><b>10</b></p>	<p>Dr. Indrajit Biswas</p>	<p>October'23- September'23</p>

	<p><b>Unit 3: Lipids</b> Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Triacylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpenoids. Lipid metabolism: <math>\beta</math>-oxidation of fatty acids; Fatty acid biosynthesis</p>	<b>4</b>	Rituparna Maity	October'23- November'23
	<p><b>Unit 4: Proteins</b> Amino acids Structure, Classification, General and Electro chemical properties of <math>\alpha</math>-amino acids; Physiological importance of essential and non-essential amino acids Proteins Bonds stabilizing protein structure; Levels of organization, Protein metabolism: Transamination, Deamination, Urea cycle, Fate of C-skeleton of Glucogenic and Ketogenic amino acids</p>	<b>14</b>	Dr. Anindya Sundar Bhunia	September'23- November'23
	<p><b>Unit 5: Nucleic Acids</b> Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids Types of DNA and RNA, Complementarity of DNA, Hypo-Hyperchromaticity of DNA Outlines of nucleotide metabolism</p>	<b>4</b>	Dr. Rehan Ahmad	September'23- October'23
	<p><b>Unit 6: Enzymes</b> Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes, Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis-Menten equation, Lineweaver- Burk plot; Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Strategy of enzyme action Catalytic and Regulatory (Basic concept with one example each)</p>	<b>12</b>	Santanu Das	September'23- October'23
	<p><b>Unit 7: Oxidative Phosphorylation</b> Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System</p>	<b>6</b>	Dr. Rehan Ahmad	November'23- December'23(1 <sup>st</sup> week)

	<p><b>BIOCHEMISTRY LAB</b> <b>PAPER CODE: ZOOACOR07T</b></p>	<b>60</b>	Dr. Anindya Sundar Bhunia	Acc. To Revised Syllabus 90% completed by end of December
--	------------------------------------------------------------------	-----------	---------------------------	-----------------------------------------------------------



	<b>SEC: SERICULTURE</b>	<b>15</b>	Dr. Indrajit Biswas	<b>4 weeks in December'23</b>
	<b>SEC LAB: SERICULTURE</b>	<b>15</b>	Dr. Indrajit Biswas	
<b>SEM-III GENERAL</b>	<b>INSECT VECTOR AND DISEASES PAPER CODE: ZOOGCOR03T</b>	<b>60</b>		
	<b>Unit-1 Introduction to Insects</b> General Features of Insects, Morphological features, Head – Eyes, Types of antennae Mouth parts with respect to feeding habit	<b>4</b>	Santanu Das	<b>September'23-October'23</b>
	<b>Unit-2 Concept of Vectors</b> Brief introduction to Vectors (mechanical and biological), Reservoirs, Host-vector relationship, Adaptations as vectors, Host specificity	<b>6</b>	Dr. Anindya Sundar Bhunia	<b>September'23-October'23</b>
	<b>Unit-3 Insects as Vectors</b> Detailed features of insect orders as vectors – Diptera, Siphonoptera, Siphunculata, Hemiptera	<b>6</b>	Dr. Indrajit Biswas	<b>September'23-October'23</b>
	<b>Unit-4 Dipteran as Disease Vector</b> Study of important Dipteran vectors – Mosquitoes, Sand fly, Houseflies vectors Study of mosquito borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis Control of mosquitoes	<b>16</b>	Dr. Indrajit Biswas	<b>September'23-December'23(1<sup>st</sup> Week)</b>
	<b>Unit-5 Siphonaptera as Disease Vectors</b> Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas	<b>10</b>	Dr. Rehan Ahmad	<b>September'23-November'23</b>
	<b>Unit-6 Siphunculata as Disease Vectors</b> Human louse (Head, Body and Pubic louse) as important insect vectors; Control of human louse	<b>8</b>	Dr. Rehan Ahmad	<b>September'23-November'23</b>
	<b>Unit-7 Hemiptera as Disease Vectors</b> Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures	<b>10</b>	Rituparna Maity	<b>September'23-November'23</b>
	<b>INSECT VECTORE AND DISEASES PAPER CODE: ZOOGCOR03P</b>	<b>60</b>	Dr. Indrajit Biswas Santanu Das	<b>Acc. To Revised Syllabus 90% completed by end of December</b>
<b>SEM-V HONOURS</b>	<b>MOLECULAR BIOLOGY PAPER CODE: ZOOACOR11T</b>	<b>60</b>		

	<b>Unit 1: Nucleic Acids</b> Salient features of DNA and RNA Watson and Crick Model of DNA	<b>2</b>	Dr. Anindya Sundar Bhunia	September'23-September'23
	<b>Unit 2: DNA Replication</b> Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres	<b>6</b>	Dr. Anindya Sundar Bhunia	September'23-October'23
	<b>Unit 3: Transcription</b> Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.	<b>8</b>	Dr. Indrajit Biswas	September'23-November'23

	<b>Unit 4: Translation</b> Mechanism of protein synthesis in prokaryotes, Ribosome structure and assembly 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	<b>14</b>	Dr. Indrajit Biswas	September'23-November'23
	<b>Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA</b> Capping and Poly A tail formation in mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA	<b>10</b>	Dr. Rehan Ahmad	September'23-November'23
	<b>Unit 6: Gene Regulation</b> Regulation of Transcription in prokaryotes: lac operon and trp operon; Regulation of Transcription in eukaryotes	<b>5</b>	Dr. Rehan Ahmad	September'23-October'23
	<b>Unit 7: DNA Repair Mechanisms</b> Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair	<b>9</b>	Rituparna Maity	September'23-November'23
	<b>Unit 8: Molecular Lab Techniques</b> PCR, Western and Southern blot, Northern Blot, Sanger DNA sequencing, cDNA technology	<b>5</b>	Santanu Das	September'23-November'23

	<b>MOLECULAR BIOLOGY LAB PAPER CODE: ZOOACOR11P</b>	<b>60</b>	Dr. Anindya Sundar Bhunia	Acc. To Revised Syllabus 90% completed by end of December
	<b>GENETICS PAPER CODE: ZOOACOR12T</b>	<b>60</b>		
	<b>Unit 1: Mendelian Genetics and its Extension</b> Background of Mendel's experiments Principles of Mendelian inheritance, Incomplete dominance and co-dominance, Epistasis, Multiple alleles, Lethal alleles, Pleiotropy, Sex-linked, sex- influenced and sex-limited inheritance, Polygenic Inheritance	<b>12</b>	Santanu Das	September'23- October'23
	<b>Unit 2: Linkage, Crossing Over and Chromosomal Mapping</b> Linkage and Crossing Over, molecular basis of crossing over, Measuring Recombination frequency and linkage intensity using three factor crosses, Interference and coincidence		Santanu Das	October'23- November'23
	<b>Unit 3: Mutations</b> 1.Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example of each), Chromosomal aberrations, gene mutations and human diseases (Down's, Klienfelter's, Turner's, Cri du Chat, Sickle cell, Haemophilia, Thallassimia, Albinism only genetical aspects here, details of physiological consequences not required), Sex chromosomes and sex-linked inheritance Non-disjunction and variation in chromosome number; Molecular basis of mutations in relation to UV light and chemical mutagen	<b>12</b>	Dr. Indrajit Biswas	November'23- Sepetember'23
	<b>Unit 4: Sex Determination</b> Mechanisms of sex determination in Drosophila with reference to alternative splicing Sex determination in mammals, Dosage compensation in Drosophila & Human	<b>12</b>	Rituparna Maity	October'20
	<b>Unit 5: Extra-chromosomal Inheritance</b> Criteria for extra chromosomal inheritance, Antibiotic resistance in Chlamyadomonas, Kappa particle in Paramoecium Shell spiralling in snail	<b>8</b>	Rituparna Maity	September'23- October'23
	<b>Unit 6: Recombination in Bacteria and Viruses</b> Conjugation, Transformation, Transduction, Complementation test in Bacteriophage	<b>8</b>	Rituparna Maity	October'23- November'23
	<b>Unit 7: Transposable Genetic Elements</b> Transposons in bacteria, Ac-Ds elements in maize and P elements in	<b>8</b>	Dr Anindya Sundar Bhunia	September'23- November'23

Drosophila, LINE, SINE, Alu elements in humans			
<b>GENETICS LAB</b> <b>PAPER CODE: ZOOACOR12P</b>	<b>60</b>	Dr. S Rehan Ahmad	Acc. To Revised Syllabus 90% completed by end of December
<b>ENTOMOLOGY</b> <b>PAPER CODE: ZOADSEO2T</b>	<b>60</b>		
<b>Unit 1: Introduction</b> General Features of Insects Distribution and Success of Insects on the Earth	<b>2</b>	Dr. Indrajit Biswas	September'23
<b>Unit 2: Insect Diversity and Classifications</b> Classifications of Arthropods with special reference to Insects (Insects are to be classified up to order) with estimated species richness of the orders globally, in India and in West Bengal. Conspicuous/important families/Genera/species of each order have to be noted with their peculiar habits and habitats)	<b>4</b>	Dr. Indrajit Biswas	September'23-October'23
<b>Unit 3: General Morphology of Insects(brief outlines)</b> External Features; Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habitsThorax: Wings and wing types, Types of Legsadapted to diverse habitats, Peculiar Abdominal appendages and genitalia- only brief introduction.	<b>12</b>	Dr. Indrajit Biswas	October'23-November'23
<b>Unit 4: Physiology of Insects</b> Structure and physiology of Insect body systems - Integumentary, digestive, excretory, circulatory, respiratory, endocrine, reproductive, and nervous system (brief outlines only) Photoreceptors: Types, Structure and Function (brief introductions) Metamorphosis: Types and Neuroendocrine control of metamorphosis (introductory)	<b>16</b>	Santanu Das	September'23-October'23
<b>Unit 5: Insect Society</b> Social insects: different types of social insectswith brief outlines of their social systems Trophallaxis in social insects such as ants, termites and bees	<b>8</b>	Rituparna Maity	October'23-November'23
<b>Unit 6: Insect Plant Interaction</b> Outline of the concept of co-evolution, role ofallo chemicals in host plant mediation, Host-plant selection by phytophagous insects; Major insect pests in paddy (brief introductions)	<b>14</b>	Dr. Rehan Ahmad	November'23

<p><b>Unit 7: Insects as Vectors</b> Insects as mechanical and biological vectors, Brief discussion on houseflies and mosquitoes as important vectors</p>	<p><b>4</b></p>	<p>Dr Anindya Sundar Bhunia</p>	<p>End In 1<sup>st</sup> Week of January'22</p>
<p><b>BIOLOGY OF INSECTS LAB</b> <b>PAPER CODE: ZOADSE02P</b></p>	<p><b>60</b></p>	<p>Dr. Indrajit Biswas</p>	<p>Acc. To Revised Syllabus 90% completed by 1<sup>st</sup> Week of January'22</p>
<p><b>ANIMAL BEHAVIOUR &amp; CHRONOBIOLOGY</b> <b>PAPER CODE: ZOADSE01T</b></p>	<p><b>60</b></p>		
<p><b>Unit 1: Introduction to Animal Behaviour</b> 1. A brief history of animal behaviour studies including the works of Fabre, Darwin, Von Frisch, Lorenz, Tinbergen, Jane Goodal, Biruté Galdikas, Dian Fossey, Salim Ali, Gopal Bhattacharyya, M. K. Chandrashekhar, Raghavendra Gadagkar. 2. The objectives of modern animal behaviour studies: Tinbergen's four questions. 3. Methods of studying behaviours: Observation vs Watching, Ad libitum observations, Focal animal studies, Instantaneous scan, etc. 4. Branches of Animal Behaviour Studies</p>	<p><b>12</b></p>	<p>Rituparna Maity</p>	<p>September'23-november'23</p>
<p><b>Unit 2: Behaviours of Individuals</b> 1. Reflexes and Orientations 2. Instinct 3. Learning: Imprinting and other Programmed Learning, Habituation, Innovations and Cultural Transmission / Social Learning</p>	<p><b>18</b></p>	<p>Rituparna Maity</p>	<p>September'23-November'23</p>
<p><b>Unit 3: Social and Sexual Behaviour</b> 1. Social Behaviour: Concept of Sociality, Types of animal Society with examples, Altruism 2. Communications in animals-different types (e.g. pheromones, visuals, tactile, acoustics, etc) with common examples 3. Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance. 4. 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>	<p><b>16</b></p>	<p>Dr. Indrajit Biswas</p>	<p>September'23-1stWeek of december'23</p>
<p><b>Unit 4: Introduction to Chronobiology</b> 1. Historical developments in chronobiology; 2. Biological oscillation: the concept of Average, amplitude, phase and period 3. Adaptive significance of biological clocks</p>	<p><b>14</b></p>	<p>Santanu Das</p>	<p>September'23-1stWeek of December'23</p>

	<b>Unit 5: Biological Rhythm</b> 1. Types and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; 2. Concept of synchronization and masking; Photic and non-photic zeitgebers; Circannual rhythms; 3. Photoperiod and regulation of seasonal reproduction of vertebrates; Role of melatonin.		Dr.Rehan Ahmad	
	<b>ANIMAL BEHAVIOUR &amp; CHRONOBIOLOGY</b>	<b>60</b>	Rituparna Maity	Acc. To Revised Syllabus 90% completed by 1st week of January '22
<b>SEM-V GENERAL</b>	<b>ANIMAL BEHAVIOUR &amp; CHRONOBIOLOGY</b>	<b>60</b>		

	<b>Unit-1 Introduction to Host-parasite Relationship</b> Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis	<b>2</b>	Santanu Das	September"23-September"23
	<b>Unit-2 Epidemiology of Diseases</b> Transmission, Prevention and control of diseases: Tuberculosis, Typhoid	<b>4</b>	Santanu Das	September"23-October"23
	<b>Unit-3 Rickettsia and Spirochetes</b> Brief account of Rickettsia prowazekii, Borrelia recurrentis and Treponema pallidum	<b>6</b>	Dr. Indrajit Biswas	September"23-October"23
	<b>Unit-4 Parasitic Protozoa</b> Life history and pathogenicity of Entamoeba histolytica, Plasmodium vivax and Trypanosoma gambiense	<b>8</b>	Dr. Indrajit Biswas	September"23-November"23

<b>Unit-5 Parasitic Helminthes</b> Life history and pathogenicity of Ancylostoma duodenale and Wuchereriabancrofti	<b>4</b>	Rituparna Maity	September'23- October'23
<b>Unit-6 Insects of Economic Importance</b> Biology, Control and damage caused by Helicoverpa armigera, Pyrilla perpusilla and Papilio demoleus, Callosobruchus chinensis, Sitophilus oryzae and Tribolium castaneum	<b>12</b>	Dr. Rehan Ahmad	November'23- November'23
<b>Unit-7 Insects of Medical Importance</b> Medical importance and control of Pediculus humanus corporis, Anopheles, Culex, Aedes, Xenopsylla cheopis	<b>8</b>	Dr. Rehan Ahmad	October'23- November'23
<b>Unit-8 Animal Husbandry</b> Preservation of semen and artificial insemination in cattle	<b>6</b>	Dr. Rehan Ahmad	September'23- October'23
<b>Unit-9 Poultry Farming</b> Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs Unit	<b>6</b>	Dr. Anindya Sundar Bhunia	September November'23-
<b>Unit-10 Fish Technology</b> Genetic improvements in aquaculture industry; Induced breeding and transportation of fish seed	<b>4</b>	Dr. Anindya Sundar Bhunia	October'23- November'23
<b>APPLIED ZOOLOGY LAB PAPER CODE: ZOOGDSE01P</b>	<b>60</b>	Dr. Rehan Ahmad Santanu Das	Acc. To Revised Syllabus 90% completed by end of December

DEPARTMENT OF ZOOLOGY



**Academic Calendar**  
**Department of Zoology, HMMCW**  
**January, 2024- June, 2024**

A. WBSU- NEP Syllabus  
 B. WBSU-CBCS Syllabus

Semester/ Year	A. WBSU- NEP SYLLABUS	No. of Lecture	Teacher Name	Distribution Tentative
<b>SEM-II HONOURS</b>	<b>DS-II: Non-Chordates II</b>	<b>45</b>		
	<b>Unit 1: Introduction to Coelomates</b> Evolution of coelom and metamerism	<b>3</b>	Dr. Indrajit Biswas	<b>July'23- October'23</b>
	<b>Unit 2: Annelida</b> General organization and classification up to classes Excretion and osmoregulation in Annelida	<b>4</b>	Santanu Das	<b>July'23- September' 23</b>
	<b>Unit 3: Arthropoda</b>  General characteristics and classification up to classes Respiration in Arthropoda General organization and evolutionary significance: King Crab and Crustacean Larvae	<b>10</b>	Rituparna Maity	<b>July'23- October '23</b>
	<b>Unit 4: Onychophora</b> General organization and evolutionary significance	<b>2</b>	Santanu Das	<b>August'23- October'23</b>
	<b>Unit 5: Mollusca</b> General characteristics and classification up to classes Nervous System and respiration in Mollusca Torsion and detorsion in Gastropoda Evolutionary significance of trochophore larva	<b>10</b>	Dr. S. Rehan Ahmad	<b>July'23- Septembe r'23</b>
	<b>Unit 6: Echinodermata</b> General characteristics and Classification up to classes Water- vascular system in Asteroidea Larval forms in Echinodermata General characteristics and Classification up to classes Water- vascular system in Asteroidea Larval forms in Echinodermata	<b>8</b>	Dr. Anindya Sundar Bhunia	<b>June'23- October'23</b>  <b>June'23- July'23</b>
	<b>Unit 7: Hemichordata</b> General organization of phylum Hemichordata. Phylogenetic	<b>8</b>		

relationship with non-chordates and chordates (only recent concepts) *. Filter feeding in Balanoglossus			
<b>DS-I: Non-Chordates I</b>	<b>30</b>	Dr. Indrajit Biswas Rituparna Maity	<b>Acc. To Revised Syllabus 90% completed by end of November</b>
Annelids - Aphrodita, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria Arthropods - Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta, termites and honey bees Onychophora - Peripatus Molluscs - Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia, Octopus, Nautilus Echinoderms - Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon Hemichordates- Saccoglossus	<b>NA</b>		
Mount of mouth parts and dissection of digestive system, nervous system and reproductive system of Periplaneta	<b>NA</b>		
To submit a project on any related to on Land / pond water invertebrate diversity or life cycle of mosquito or Butterfly/moth etc or coral and coral reef. To submit a project on any related topic on Land / pond water invertebrate diversity or life cycle of mosquito or Butterfly/moth etc or coral and coral reef.	<b>NA</b>		
Study of Obelia, Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia, Metridium, Pennatula, Fungia, Meandrina, Madrepora	<b>NA</b>		
One specimen/slide of any Ctenophore	<b>NA</b>		
Study of adult Fasciola hepatica, Taenia solium	<b>NA</b>		
Study of adult male and female Ascaris lumbricoides	<b>NA</b>		

SEM-II GENERAL	<b>Physiology and Biochemistry</b>			
	<b>Unit-1 Nerve and muscle</b> 1. Structure of a neuron, Resting membrane potential, Graded potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres. 2. Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction.	<b>8</b>	Dr. Indrajit Biswas	July'23
	<b>Unit-2 Digestion</b> Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids	<b>5</b>	Dr. Indrajit Biswas	August'23
	<b>Unit-3 Respiration</b> Pulmonary ventilation, Respiratory volumes and capacities, Transport of Oxygen and carbon dioxide in blood	<b>5</b>	Dr. Indrajit Biswas	September'23
	<b>Unit-4 Excretion</b> Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism	<b>5</b>	Dr. Anindya Sundar Bhunia	July'23
	<b>Unit-5 Cardiovascular system</b> Composition of blood, Homeostasis, Structure of Heart, Origin and conduction of the cardiac impulse, Cardiac cycle	<b>6</b>	Dr. Anindya Sundar Bhunia	August'23
	<b>Unit-6 Reproduction and Endocrine Glands</b> Physiology of male reproduction: hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle. Structure and function of pituitary, thyroid, pancreas	<b>7</b>	Dr. Anindya Sundar Bhunia	Spetember'23
	<b>Unit 7 Carbohydrate: Structure and Metabolism</b> Introduction to Carbohydrates, Structure & Types of Carbohydrates, Isomerism, Introduction to Intermediary metabolism: Glycolysis, Krebs cycle, Pentose phosphate pathway, Gluconeogenesis, Electron transport chain	<b>8</b>	Santa nu Das	July-August'23
	<b>Unit-8 Lipid: Structure and Metabolism</b> Introduction to Lipids: Definitions; fats and oils; classes of lipids; Lipoproteins; Biosynthesis and $\beta$ oxidation of	<b>5</b>	Santanu Das	September-October'23

	palmitic acid			
	<b>Unit-9 Protein: Structure and metabolism</b> Proteins and their biological functions, functions of amino acids, physicochemical properties of amino acids. Peptides – structure and properties; primary structure of protein, secondary, tertiary and quaternary structures. Transamination, Deamination and Urea Cycle.	5	Rituparna Maity	July-August'23
	<b>Unit-10 Enzymes</b> Introduction, Classification of Enzymes, Mechanism of action, Enzyme Kinetics, Inhibition and Regulation	4	Rituparna Maity	September'23
	<b>PHYSIOLOGY AND BIOCHEMISTRY LAB.</b>		Dr. Anindya Sundar Bhunia Santanu Das	90% will be completed on December'23
	WBSU CBCS SYLLABUS			
<b>SEM-IV HONOURS</b>	<b>ZOOACOR08T: Comparative Anatomy</b>			
	Unit 1: Integumentary System Structure, function and derivatives of integument in amphibian, birds and mammals	6		
	Unit 2: Skeletal System Overview of axial and appendicular skeleton; Jaw suspension; Visceral arches	8		
	Unit 3: Digestive System Comparative anatomy of stomach; dentition in mammals	6		
	Unit 4: Respiratory System Respiratory organs in fish, amphibian, birds and mammals	8		
	Unit 5: Circulatory System General plan of circulation, Comparative account of heart and aortic arches	6		
	Unit 6: Urinogenital System Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri	6		
	Unit 7: Nervous System Comparative account of brain, Cranial nerves in mammals	6		
	Unit 8: Sense Organs Classification of receptors, Brief account of auditory receptors in vertebrate	4		
	<b>Comparative Anatomy Lab</b> 1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs 2. Study of disarticulated skeleton of Toad, Pigeon and Guineapig 3. Demonstration of Carapace and plastron of turtle 4. Identification of mammalian skulls:			

One herbivorous (Guineapig) and one carnivorous (Dog) animal			
5. Dissection of Tilapia: Circulatory system, Brain, pituitary, urinogenital system			
<b>Physiology: Life Sustaining system</b>			
Unit 1: Physiology of Digestion Structural organisation and functions of Gastrointestinal tract and Associated glands; Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids, Proteins and Nucleic Acids; Digestive enzymes	12		
Unit 2: Physiology of Respiration Mechanism of Respiration, Respiratory volumes and capacities, transport of Oxygen and Carbon dioxide in blood, Dissociation curves and the factors influencing it, respiratory pigments; Carbon monoxide poisoning	10		
Unit 3: Physiology of Circulation Components of Blood and their functions; Structure and functions of haemoglobin; Haemostasis; Blood clotting system, Fibrinolytic system; Haemopoiesis: Basic steps and its regulation; Blood groups; ABO and Rh factor	12		
Unit 4: Physiology of Heart Structure of mammalian heart, Coronary Circulation, Structure and working of conducting myocardial fibers, Origin and conduction of cardiac impulses; Cardiac Cycle and cardiac output; Blood pressure and its regulation	8		
Unit 5: Thermoregulation & Osmoregulation Physiological classification based on thermal biology. Thermal biology of endotherms; Osmoregulation in aquatic vertebrates; Extra-renal osmo-regulatory organs in vertebrates	10		
Unit 6: Renal Physiology Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid-base balance	8		
<b>Animal Physiology: Life Sustaining system Lab</b>			
<ol style="list-style-type: none"> <li>1. Determination of ABO Blood group</li> <li>2. Enumeration of red blood cells and white blood cells using haemocytometer</li> <li>3. Estimation of haemoglobin using Sahli's haemoglobinometer</li> <li>4. Preparation of haemin and haemochromogen crystals</li> <li>5. Recording of blood pressure using a sphygmomanometer/digital meter</li> </ol>			
<b>Immunology</b>			
Unit 1: Overview of Immune System Basic concepts of health and diseases, Historical perspective of Immunology, Organs (Primary & Secondary lymphoid organs and its importance) and Cells of the Immune system, Concept of	4		

Haematopoiesis and development of progenitor cells of the Immune system (Brief idea)			
Unit 2: Innate and Adaptive Immunity Principle of Innate and Adaptive Immunity. Components of innate immunity – Epithelial barriers (skin and mucosal membranes [concept]) – Cellular mechanisms (phagocytes, NK cells, mast cells, eosinophils, inflammation [concept]) – Humoral mechanisms (complement, cytokines, chemokines etc. [concept]) Components of adaptive immunity – Cellular mechanisms (Cell-Mediated Immune System (CMIS) or TCell Immunity [concept]) – Humoral mechanisms (Formation of Plasma B cells and Memory B cells [concept])	6		
Unit 3: Antigen, Antigen presentation & MHC Concept of Antigen, Immunogen, Allergen & Pathogen. Adjuvants and haptens, Factors influencing immunogenicity, Epitope. Types of Antigen Presenting Cells (APC), Structure of Major Histocompatibility Complex (MHC) molecules. Mechanism of antigen presentation and involvement of MHC molecules (both MHC-I & MHC-II) in details. Co-stimulatory molecules on APC.	6		
Unit 3: T Cell development Structure of T cell receptors, Co-stimulatory molecules on T cells Concept of synapse between APC & T cells (between MHC=TCR & between Costimulatory molecules) in details. Central differentiation of T cells; T cell selection in thymus Peripheral differentiation of T cells; Th1 & Th2	6		
Unit 4: Immunoglobulins Structure and functions of different classes of immunoglobulins, Antigen- antibody interactions, Immunoassays (ELISA and RIA), Hybridoma technology, Monoclonal antibody production	6		
Unit 6: Cytokines & Chemokines Brief concept on types of Cytokines & Chemokines Cytokines (source & function of IL-1, IL-2, IL-4, IL-5, IL-6, IL-8, IL-10, IL-12, Interferons, Tumor Necrosis Factors, Tumor Growth Factors, GM-CSF, M-CSF). Chemokines (source & function of CCL2, CCL3, CCL4, CCL5, CxCL8, CxCL10)	4		
Unit 7: Complement System Components and pathways of complement activation.	4		
Unit 8: Hypersensitivity Gell and Coombs' classification and brief description of various types of hypersensitivities	4		
Unit 9: Immunology of diseases Malaria, Visceral Leishmaniasis, Filariasis, Dengue and Tuberculosis	4		
Unit 10: Vaccines Various types of vaccines. Active & passive immunization (Artificial and natural).	4		
Immunology Lab			

	1. Demonstration of lymphoid organs. 2. Histological study of spleen, thymus and lymph nodes through slides/ photographs 3. Preparation of stained blood film to study various types of blood cells. 4. ABO blood group determination. 5. Demonstration of ELISA using kit.			
SEM-IV GENERAL	<b>Immunology</b>			
	Unit-1 Overview of the Immune System Introduction to basic concepts in immunology, components of immune system, principles of innate and adaptive immune system	5		
	Unit-2 Cells and Organs of the Immune System Haematopoiesis, Cells of immune system and organs (primary and secondary lymphoid organs) of the immune system	8		
	Unit-3 Antigens Basic properties of antigens, B and T cell epitopes, haptens and adjuvants	5		
	Unit-4 Antibodies Structure, classes and function of antibodies, monoclonal antibodies, antigen antibody interactions as tools for research and diagnosis	8		
	Unit-5 Working of the immune system Structure and functions of MHC, exogenous and endogenous pathways of antigen presentation and processing, Basic properties and functions of cytokines, Complement system: Components and pathways	12		
	Unit-6 Immune system in health and disease Gell and Coombs' classification and brief description of various types of hypersensitivities, Introduction to concepts of autoimmunity and immunodeficiency	10		
	Unit-7 Vaccines General introduction to vaccines, Types of vaccines	2		
	<b>Immunology Lab.</b> 1. Demonstration of lymphoid organs in human through model/ photograph. 2. Histological study of spleen, thymus and lymph nodes through slides/photographs 3. Preparation of stained blood film to study various types of blood cells. 4. ABO blood group determination			
SEM-VI HONOURS	<b>Developmental Biology</b>			
	<b>Unit 1: Introduction</b> Basic concepts: Phases of Development, Cell-cell interaction, Differentiation and growth, Differential gene expression	2		
	<b>Unit 2: Early Embryonic Development</b> Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal): Changes in gametes, Blocks to polyspermy; Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers	20		

<p><b>Unit 3: Late Embryonic Development</b> Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta)</p>	8		
<p><b>Unit 4: Post Embryonic Development</b> Development of brain and Eye in Vertebrate Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each)</p>	12		
<p><b>Unit 5: Implications of Developmental Biology</b> Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis</p>	8		
<p><b>Developmental Biology Lab</b> 1. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages) 2. Study of the developmental stages and life cycle of Drosophila from stock culture 3. Study of different sections of placenta (microphotographs/ slides) 4. Project report on Drosophila culture/chick embryo development</p>			
<p><b>Evolutionary Biology</b></p>			
<p><b>Unit 1: Origin of earliest life</b> Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes, three domains of life</p>	5		
<p><b>Unit 2: Historical review of evolutionary concept</b> Pre-Darwinian Concepts and theories including Lamarckism, Darwinian Theory Neo-Darwinian Synthesis Anti-evolutionary ideas of Creationism and their scientific refusal</p>	7		
<p><b>Unit 3: Evidences in favour of Evolution</b> Fossil records: types of fossils, geological time scale, transitional forms: examples of fossils depicting the evolutionary stages of the modern horses Molecular (universality of genetic code and protein synthesis machinery) evidences</p>	4		
<p><b>Unit 4: Sources of variations</b> Heritable variations present in natural populations (classical study of Lewontin and Hubby, 1966 in Drosophila, as example)</p>	3		
<p><b>Unit 5: Population genetics</b> Concept of Populations and calculation of allele frequencies in a population Hardy-Weinberg Law and equilibrium (derivations, applications of law to find gene and genotype frequencies in human Populations) Evolutionary forces disrupting H-W equilibrium Natural selection: Definition as the non-differential rate of reproductions and survivals of competing alleles, concept of fitness, selection coefficient, Types of natural selection with examples- Disrupting, Stabilizing, Directional. Genetic Drift- outline of its</p>	16		



mechanism, basic concepts and examples of founder's effect, bottleneck phenomenon; Role of Gene flow and Mutation rates in changing allele frequencies in a population (No mathematical models)			
<b>Unit 6: Products of evolution</b> Inter-population variations: clines, races, Species concepts and modes of speciation (just outlines of Allopatric, Sympatric and Parapatric speciation models with examples ), Isolating mechanisms Adaptive radiations/ macroevolution as exemplified by Galapagos finches	10		
<b>Unit 7: Extinctions</b> Major mass extinctions in the history of life and their impacts on biodiversity on earth (brief descriptions)	2		
<b>Unit 8: Origin and evolution of man</b> Unique hominin characteristics contrasted with primate characteristics (including social and cultural ones), Primate phylogeny: from Dryopithecus leading to Homo sapiens, Molecular evidences of human origin and migrations (brief outline)	6		
<b>Unit 8: Molecular Phylogeny</b> The basic concept of molecular phylogeny, Neutral theory of molecular evolution, molecular clock (brief introductions) Example of evolution in vertebrate globin genes	7		
<b>Evolutionary Biology Lab</b> 1. Study of fossils from models/ photographs- Direct ancestors of horses, Archaeopteryx 2. Study of homology and analogy from suitable specimens (from Photographs/models) 3. Verification of Hardy-Weinberg equilibrium in a population by chi square analysis 5. Collection of a sample of height, weight, age, sex data from at least 100 individuals and applying of different statistical analyses (frequency distribution, mean, mode, standard deviations, correlations, etc) and graphical representations.			
<b>Parasitology</b>			
<b>Unit 1: Introduction to Parasitology</b> Brief introduction of Parasitism and other animal associations, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship and zoonosis	3		
<b>Unit 2: Parasitic Protists</b> Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Entamoeba histolytica, Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani, Plasmodium vivax , Plasmodium falciparum and Toxoplasma gondii	15		
<b>Unit 3: Parasitic Nematodes</b> Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Ascaris lumbricoides, Ancylostoma duodenale, Wuchereria bancrofti and Trichinella spiralis. Study of structure, life	15		

cycle and importance of Meloidogyne (root knot nematode), Pratylenchus (lesion nematode)			
<b>Unit 4: Parasitic Arthropoda</b> Mosquitoes and flies as vectors of human pathogen Biology, importance and control of myiasis causing diptera Biology, importance and control of ticks, mites, Pediculus humanus (head and body louse), Xenopsylla cheopis and Cimex lectularius	3		
<b>Unit 6: Parasitic Vertebrates</b> A brief account of parasitic vertebrates; Cookiecutter Shark, Candiru, Hood Mockingbird and Vampire bat	2		
<b>Parasitology Lab</b> Study of life stages of Entamoeba histolytica, Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani and Plasmodium vivax through permanent slides/micro photographs Study of adult and life stages of Fasciola hepatica, Schistosoma haematobium, Taenia solium and Hymenolepis nana through permanent slides/micro photographs. Study of adult and life stages of Ascaris lumbricoides, Ancylostoma duodenale, Wuchereria bancrofti and Trichinella spiralis through permanent slides/micro photographs .Study of plant parasitic root knot nematode, Meloidogyne from the soil sample Study of Pediculus humanus (Head louse and Body louse), Xenopsylla cheopis and Cimex lectularius through permanent slides/ photographs Study of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market as by product of the industry] Study of nematode/cestode parasites from the intestines of Poultry bird [Intestine can be procured from poultry/market as a by product]			
<b>Wildlife and Conservation</b>			
<b>Unit 1: Introduction to Wild Life</b> Values of wild life; Importance of conservation; Causes of depletion of Wildlife in India;	5		
<b>Unit 2: Evaluation and management of wild life</b> Forest habitats: major forest types of India and West Bengal Forest covers estimation: remote sensing and GIS	12		
<b>Unit 3: Management of habitats</b> Management of Successional wild habitats Forest fire Restoration of degraded wild habitats (The above topics should be learnt mostly in reference to the protected areas in West Bengal)	8		
<b>Unit 4: Population estimation</b> Population and population density estimations: different methods in practice Sex Ratio computation and Fertility status	10		
<b>Unit 5: Wildlife conservation practices in</b>	5		

<p><b>India</b> Traditional Conservation ethics and practices in India Conservation strategies and Practices: Wildlife Acts (IUCN, WPA of India, CITES etc)</p>			
<p><b>Unit 6: Management planning of wild life in protected areas</b> Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbence.</p>	5		
<p><b>Unit 7: Man and Wildlife</b> Causes and consequences of human-wildlife conflicts; Mitigation of conflict – an overview; Wildlife/Ecotourism advantages and disadvantages</p>	5		
<p><b>Unit 8: Protected areas</b> Major wildlife areas in India (all from West Bengal): Sanctuaries, National Parks, Tiger and other Wildlife Reserves, Biosphere reserves, etc. Community reserve: concepts and examples Management challenges in Tiger reserve</p>	10		
<p><b>Wildlife and Conservation Lab</b> 1. Identification of common local flora, mammalian fauna, avian fauna, herpeto-fauna 2. Demonstration of basic equipments needed in wildlife studies use, care and maintenance (Compass, Binoculars, Range Finders, Global Positioning System, Various types of Cameras and lenses) 3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, etc. 4. Demonstration of different field techniques for flora and fauna 5. Quadrat and other methods for ground cover assessment, Height-Girth relationships in trees, Canopy cover assessment in a patch of vegetations. 6. Trail / transect monitoring for abundance and diversity estimation of mammals and birds, butterflies (direct and indirect evidences)</p>			