# Academic Calendar

### Department of Zoology, HMMCW

### July, 2017- June, 2018

#### WBSU 3-Year B.Sc. Syllabus Under (1+1+1) System

BSC. /YEAR PART/MODULE	SYLLABUS - PAPER	NO OF LECTURES	NAME OF TEACHER	TENTATIVE SCHEDULE
BSc. (Hons') PART I	Paper-01: Diversity of Animals and Animal behaviours			
Module ZH101 :Living kingdoms and protozoans	<ol> <li>Introduction to the modern classification of living organisms into Kingdoms, magnitude of diversity of living organisms: estimated species richness</li> <li>Introduction to the Kingdom Protozoa: Classifications (up to Phylum only) and examples;</li> </ol>	10	Dr. Indrajit Biswas	July'17- August'17
	contractile vacuoles, structures of cilia, reproduction in Paramoecium.			
Module ZH102: Non-Chordates	<ol> <li>Species diversity and classifications of non-chordate phyla (upto the levels as mentioned below) with salient features and prominent examples of the animal groups: Poriferans, Cnidarians, Ctenophorans, Platyhelminths, Aschelminthes, Annelids, Molluscs, Echinoderms, Arthropods (upto subclass),Rotifera, Bryozoa, Hemichordata (only salient features of the Phyla)</li> <li>Special topics to understand the diversity of non-chordate structures and functions:</li> <li>Body planes and symmetries, coelom, deuterostome vs protostome (only preliminary conceptual outlines);2.2 Polymorphisms in Cnidaria;2.3 Coral reef: types, formation, distribution, conservation significance;2.4 Torsions in</li> </ol>	35	Dr. Indrajit Biswas	August'17- October'17

	Gastropods;2.5 Cyclomorphosis in Rotifers;2.6 Excretion in invertebrates with special reference to flame cells, nephridia, coelomoducts and malpighian tubules;2.7 Gas exchange by gills and trachea in Arthropods 2.8 Water vascular system and haemal system in Echinoderms;2.9 Brief overview of invertebrate larval forms			
Module ZH103: Chordates	1.Chordate Classifications: (up to orders with salient features and examples, except for birds and mammals only names and examples of the orders);2Chordates: special topics reflecting diversity of adaptations: 2.1Feeding in Cephalochordates and Urochordates. 2.2 Larval form and metamorphosis in Ascidians.2.3 Experimental analysis of function of a vertebrate structure: study of feeding strike of a venomous Snake 2.4Biting, venom delivery and feeding in snakes 2.5 General features of vertebrate integument and its specialization with reference to exoskeletons 2.6Evolution of aortic arches in vertebrates 2.7Evolutionary trend in vertebrate brains 2.8Tripartite concept of kidney organization 2.9Ruminant stomachs- Digestive tract specializations as fermentation chambers in herbivore mammals 2.10Dentitions in vertebrates 2.11Vertebrae: different types	35	Dr.Anindya Sundar Bhunia	October'17- December'17
Module ZH104: Animal Behaviour	<ul> <li>1.Tinbergen's four questions on studying animal behaviour;2.Definitions and examples of habituation, instinctive behaviour, FAP, imprinting and other programmed learning, cultural transmission;</li> <li>3.Social animals- advantages and disadvantages of living in a group. (Examples of social animals and</li> </ul>	20	Dr. Indrajit Biswas	December'17

	outline of their social structures; 4. Definition and examples of altruism, eusociality, units of selection (just preliminary ideas)			
	Paper 02: Evolution and Preliminary Knowledge for Quantification in biology			
Module ZH201: Evolution	Quantification in biology 1.Rise of evolutionary theories: the historical outline- conflict between creationists' idea and evolutionary theories, Lamark's theory, Theories proposed by Darwin and Wallace, modern form of Darwinian theory including modern synthesis 2.H-W theorem and its significance in evolutionary theory, calculating gene frequencies for H-W and non-H-W populations (very simple problems only), Variations in natural populations. 3.Nature and actions of natural selection-evolution of industrial melanism in Biston betularia as example, 4.Genetic Drift, Gene Flow and Mutation Rate (only definitions and outlines of these processes, details of nature of actions by each, mathematical models not necessary) 5. Critical concepts (only preliminary and brief discussions)- 5.1 Application of the concept of adaptation- precise definition of adaptation in evolutionary sense, critique of adaptationist program';5.2 Trends in the evolution of modern horses- outlines only; 5.3 Measurement of rates of evolution-with the example of equine teeth including allometry; 5.4 Punctuationist vs. gradualist mode of evolutionary changes; 5.5 Heterochrony - as a process of macroevolution, just definitions of the heterochronic processes and examples including Neoteny and	35	Dr. Anindya Sundar Bhunia & Smt. Jayashree Shit	December'17- January/18
	the heterochronic processes and examples including Neoteny and Progenesis; 5.6 Process of			

	speciation: concept of			
	reproductively isolated species			
	and models of speciation-			
	Allopatric, Sympatric and			
	Parapatric models; 5.7 Recent			
	evolution: a brief outline			
Module 7H202	1 Logarithm Matrices	15	Sd. Anwarul	December'17
Preliminary	Permutation and Combination	15	Haque	January'18
knowledge for	Probabilities (just preliminary			January 10
quantification in	concents and very simple			
biology	problems to be worked out)			
	2. Graphical representation of			
	data- bar chart, histograms,			
	scatter plots, pie charts; Discrete			
	and Continuous variables-			
	examples, Normal distribution			
	(only primary characteristics and			
	examples, detailed mathematical			
	characterizations not required);			
	Mean, Mode and Median,			
	Standard deviation, Variance and			
	Standard error; Simple			
	Correlations; concept of			
	Hypothesis lesting, lests for			
	goodness of fit- Chi-square,			
	Student t-test for comparing			
	nears of two small samples from			
	Demor 02: Prosticale	60+60	Dr. Indraiit	
	Paper-03: Practicals	00+00	Biswas	
	Module 2H301: Morpho-		&	
	anatomical studies		Smt. Jayashree	
	Module 2H302: Identifying		Shit	
	Important and common animals			
	watching			
	Paper IV (Theory): Consting			
BSC. (Hons')	Coll and Molecular Biology			
PART II	Piochomistry and Pionbysics			
Madula 401	1 Significance of Mondol's	20	Smt Javashree	1.1.1.217
Genetics	avperiments and laws. Concents	20	Shit	July 1/-
Genetics	and examples of Test Cross and			August 10
	Back Cross Incomplete			
	Dominance/Codominance			
	Multiple Alleles Epistasis			
	Polygenic inheritance			
	2. Chromosomal aberrations			
	gene mutations and human			
	diseases (Down's, Klienfelter's,			
	Turner's, Cri du Chat, Sickle cell,			
	Haemonhilia Thallassimia			

	Albinism – only genetical aspects here, details of physiological consequences not required), Sex chromosomes and sex-linked inheritance 3. Linkage and Recombination – Types and outcome, linkage disequilibrium, 3-point cross			
Module 402: Cell	1.Units of biological	30	Dr. Anindya	August'17-
Biology and	measurements and microscopy		Sundar Bhunia	September'17
Molecular	2. Plasma membrane: lipid			
Biology	bilayer, membrane proteins and			
	membrane transport – brief			
	outline			
	3. Other organelles: introduction			
	to structure and functions of			
	mitochondria, GERL			
	4. Cell Cycle: preliminary concept			
	5. Replication: only outline of the			
	6 Transcription: only outling of			
	the mechanisms			
	7. Translation: only outline of the			
	mechanisms			
	8. Gene expression-lac operon,			
	trp operon (only introductory			
	outline of the processes) 9. Types			
	of mutations			
	10. Transposable genetic			
	elements (preliminary			
	introductions			
	11. Genetic engineering-			
	preliminary concepts and			
	common examples			
	12. Introductory principles of			
	common methods used in cellular			
	DNA fingerprinting Gone			
	sequencing			
Module 403:	1 Chemical evolution of	30	Dr. Indrajit	August'17-
Biochemistry	biomolecules (outline only)		Biswas	December'17
,	2.Biological significance of water			
	3.Structural identities of			
	biomolecules: Carbohydrates,			
	Amino Acids, Peptides, Lipids			
	(preliminary Outlines of lipids),			
	nucleic acids			
	4. Enzymes (major classes of			
	enzymes-mode of actions and			
	examples) and enzyme kinetics			
	5.Metabolic pathways: Glycolysis,			
1	HIVIP shunt, Kreb's cycle, electron			1

	transfer system (outline), Gluconeogenesis, Glycolysis, beta			
Module 404: Biophysics	1.Three-dimensional structure of proteins (preliminary concepts only): peptide bonds, alpha helix, beta conformation, common examples of globular proteins;2.Structure of nucleic acids (preliminary concepts only): DNA and RNAS;3.Chromosome structure including Nucleosomes (preliminary concepts only;4.Introductory principles of common methods used in biochemistry and biophysics: Chromatography, Ultracentrifuge, Electrophoresis, X-ray crystallography, Immunoeletrophoresis & Western blotting	20	Jayashree Shit	December'17- January'18
	Paper V (Theory): Taxonomy, Ecology, Biodiversity & Microbiology, Parasitology, Immunology			
Module 501: Taxonomy and Systematics	1.Modern definitions of taxonomy and systematics, philosophy and working of modern taxonomy, Linaean hierarchy 2.Concept of a species in taxonomic practices3.ICZN and its important rules, 4.Cladistics: simple introductory concept and examples	10	Dr. Indrajit Biswas & Smt. Rituparna Maity	January'18
Module 502: Ecology	1. Ecology of populations: survivorship curves, life history tables, age-sex pyramids, population growth models (exponential and logistic models only) 2. Ecology of communities: defining a community, measuring species diversity, species interactions (competition and coexistence, predation, herbivory, mutualism), succession and concept of climaxes, Theory of Island Biogeography (introductory concepts only) 3. Ecosystems ecology: trophic structure, energy flow, nutrient cycling	25	Smt. Rituparna Maity	August'17- December'17
Module 503: Biodiversity and Wildlife Conservation	1.Biodiversity: concept of biodiversity, Importance of biodiversity, Megadiversity country, CBD, Indian Biodiversity Act., biodiversity hotspots, India- a megadiversity country, CBD, Indian Biodiversity Act. 2.Wildlife Conservation: Major forest types and		Smt. Jayashree Shit	December'17

Module 504:	their locations in India, Major wildlife of India – their Indian distribution, present status, conservation efforts (PAs- major sanctuaries and national parks, Indian Wildlife Act, IUCN categories, Project tiger as a case study) 1.The study of microbial structure, 2.	15	Dr. Indrajit Biswas	October'17-
Microbiology	growth 4. Control of Microorganisms by Physical and Chemical agents 5.Pathogenicity of Microorganisms 6.Human diseases caused by Virus (polio, avine influenza) Bacteria (cholera, tuberculosis), Fungi (ringworm)			January 18
Module 505: Parasitology	1.Concept of parasitism 2. Origin and evolution of parasitism, host parasitic interactions, 3.Parasitic adaptation: physiological, bio-chemical, Zoonosis, Myasis 4.Identifying characters, life cycles, mode of infections of important parasites – Entamoeba, Giardia, Fasciola, Taenia, Ascaris	15	Dr. Indrajit Biswas	October'17- January'18
Module 506: Immunology	1.What is Immunology: a short preview of the development of the subject 2.Innate (Nonspecific) and Acquired (Specific) immunity. 3.Central dogma of Immune system: (a) Cells of Immune system (b) Organs of Immune system- Primary & Secondary lymphoid organs 4.Concept of Antigen & Antigen Presentation: Antigenic determinant (for ABO and Rh group only) 5. The Major Histocompatibility Complex: Antigen processing & presentation 6.Concept of T Cell-Antigen recognition and activation [Intracellular signal transuding enzymes excluded]: Structure and function of TCR complex, APC-T Cell interaction, 7.Concept of B Cell Activation and Antibody production [Intracellular signal transuding enzymes excluded]: Structure & Function of Immunoglobins [class switching among Immunoglobin gene excluded].Antigenic determinants of Immunoglobins (Isotype, Allotype & Idiotype). 8. 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).9. The Complement System (Basic concepts	20	Dr. Indrajit Biswas	January'18- March'18

	& Types only) 10. Techniques in Immunology: ELISA, RIA, Immunodiffusion Techniques,			
	Paper VI: Practicals -		Smt. Jayashree	
	Group A and Group B		Shit & Dr. Amrita Banerjee	
BSc. (Hons')	Paper VII: Theory		-	
PART III				
Module 701:	1. Transport across cell surface	40	Dr. Anindya	July'17-
Animal	membrane, Donnan membrane		Sundar Bhunia	December'17
Physiology	equilibrium;2. Functions of			
	mammalian blood: Oxygen			
	transport and CO <sub>2</sub> transport;3.			
	Neurophysiology: Generation of			
	action potential and propagation			
	and non-myolinated nonyo fibors			
	Synaptic and neuro-mascular			
	iunctions: structure and			
	functions ;4. Respiration: gill			
	respirations in fishes, respiration			
	in air-breathing fishes, respiration			
	in avian lungs;5. General			
	architecture of skeletal (striated)			
	muscle and smooth muscle;			
	Ultrastructure of skeletal muscle			
	sarcomere, molecular structure of			
	contraction: sliding filament			
	theory :6. Swim bladder and its			
	functions in teleost fishes:7.			
	Water and osmotic regulations:			
	problems in marine cyclostomes,			
	elasmobranchs and teleosts,			
	freshwater teleosts, in hot desert			
	environments(camel) and			
	examples of significant			
	adaptations solving it by different			
	animal groups;8. Urine formation			
	In numan kidney;9.			
	mechanism of production			
Module 702:	1. Classification of vertebrate	40	Smt. Jayashree	July'17-
Endocrinology	hormones based on chemical		Jint	December'17
Boproductivo	nature and mechanism of action			
hiology	Hormone delivery systems:			
Sidiogy	Endocrine neuroendocrine			
	paracrine, neurocrine, autocrine			

	(Definitions and examples only); 3. Feedback control of hormone secretion: negative and positive. 4. Hormone biosynthesis (including sites of synthesis, outlines only): Thyroid hormones (T3, T4), testosterone, estrogen, progesterone, adreno-cortical hormones, Insulin, Adrenal catecholamines. 5. Physiologic functions of hormones: Insulin, glucagon. T3 and T4.;6. Hormonal control of spermatogenesis;7. Hormonal control of mammalian ovarian cycle, differences between estrous and menstrual cycle. 8. Mechanism of hormone actions (outlines only): cytoplasmic receptor, nuclear receptor, membrane Receptor, HRE, HSP, CAMP, cGMP, IP3-DAG, tyrosine kinase, calcium- calmodulin 9. Endocrine disorders (symptoms and causes only): Diabetes insipidus; IDDM & NIDDM. Hypothyroidism and hyperthyroidism, Conn's and Cushing's syndrome.			
Module 703: Histology	1.Basic tissue types: epithelial, connective, cardiac and nervous tissue(typical structure of neuron and types of neuron, glial cells etc);2.Membrane specializations of epithelia. (Intercellular surface [cell junctions], luminal surfaces and Basal surfaces.).; 3.Exocrine glands: Types and discharge of secretory products (merocrine, apocrine, holocrine).;4.Principles of tissue fixation, staining,;5.Histology of: stomach, pancreas, testis, ovary, thyroid, lymph node. (Outline of structures). 6. Histological structure of mammalian nephron and functions of each regions.	20	Dr. Amrita Banerjee	July'17- September'17
	Paper VIII: Theory			
Module 801: Developmental Biology	1.Outlines of historical concepts and experiments in the emergence of developmental	30	Dr. Amrita Banerjee	September'17- December'17

	biology- Induction,Fate map,			
	Spemann and Mangold's			
	organizer transplant experiments,			
	von Baer's laws.; 2. Germ layers			
	and its contributions to the			
	development of different tissues			
	in vertebrates;. 3.Origin of germ			
	cells, Structural features of			
	sperms and eggs in sea urchins			
	and in mammals, Gametogenesis			
	in mammals,; 4. Fertilization:			
	external fertilization in sea			
	urchins, internal fertilization in			
	mammals (in depth molecular			
	Details not required); 5.Cleavage			
	Types of cleavage found in			
	animals and animal groups that			
	exhibit a type, outlines of			
	cleavage process in C . elegans,			
	Zebrafish and Xenopus and chick;			
	6.Gastrulation: generalized			
	patterns, brief outlines of the			
	process in C. elegans, Zebra fish,			
	Xenopus and chick			
	;7.Organogenesis: development			
	of brain in chicken; 8. Conceptual			
	outlines (very brief) of – Cell			
	potency and Stem Cells, Sex			
	determination in Drosophila and			
	Man, Environmental sex			
	determination in reptiles. HOX			
	genes in development			
Module 802:	1. Environmental pollutions	20	Smt. Rituparna	November'17-
Environmental	(nature and sources of pollutants.		Maity	December'17
Pollutions and	Impacts on ecosystems and			
Toxicology	humans, remedies): water, soil,			
	air and sound			
	pollutions;2.Environmental laws:			
	major ones applicable in West			
	Bengal;3.Toxicology: including its			
	significance as a branch of			
	Science;4.Dose-response			
	relationships;5.In vivo and In vitro			
	toxicity test;6.Introduction to the			
	concepts of detoxication			
	mechanisms			
Module 805:	1. Mosquito-borne diseases:	15	Dr. Indrajit	January'18-
Medical Zoology	Malaria and Filaria- causative		Biswas	February'18
	agents, their life cycle, modes of			
	infections in man, major modes of			
	treatments, major vector species			
	in India, their ecology and life			

	cycles, control measures; 2. Mosquito-borne diseases: Dengue and DHF, Chikungunya- causative virus, symptoms and treatments;3. Visceral Leishmaniasis (Kala-azar)- causative species and vectors in West Bengal; 4. Common ticks and mites in human surroundings			
	and diseases caused by them			
Module 806: Economic Zoology	<ol> <li>Fishes and fishery: diversity of indigenous freshwater, estuarine, marine fishes and shell fishes in West Bengal. Invasive and exotic species of fishes in West Bengal.</li> <li>Techniques of modern pisciculture and prawn culture.</li> <li>Problems related to wild prawn seed collections in Sunderbans, fish productivities in India and West Bengal, ecology and degradation of freshwater fish habitats and decrease in wild fish stocks (very brief idea); 2.</li> <li>Sericulture: silks and silk worms, sericulture practices- methods, scopes and problems; 3.</li> <li>Apiculture: Honey bees and their behaviours in relation to bee- keeping, popular methods of bee keeping, scopes and problems; 4.</li> <li>Lac culture: Lac and lac insects, host plants and lac cultivation, scopes and problems; 5. Poultry birds: different breeds, their advantages and disadvantages.</li> </ol>	35	Dr. Indrajit Biswas Smt Jayashree Shit Smt Rituparna Maity	October'17- February'18
	importance of indigenous breeds 6. Cattle, goats and lambs: different breeds, their advantages and disadvantages, importance of Indigenous breeds			
	Paper IX: Practical Group A Group B	60+60	Dr. Anindya Sundar Bhunia & Dr. Indrajit Biswas Smt. Jayashree Shit & Dr. Amrita Banerjee	
BSc. General	Group A-Nonchordates 1. Classification with distinctive features and suitable examples of	30	Dr. Indrajit Biswas	August'17- September'17

Part-1	sub kingdom Protozoa (upto Phyla) and Phylum Porifera, Cnideria, Platyhelminthes, Nemathelminthes, Annelida, Arthropoda, Mollusca andEchinodermata (upto Sub class). 2. General structure and function of the following with reference to the specimens mentioned: 1) Locomotion: a) Microfibrils (Amoeba), b) Cilia (Paramoectum), c) Parapodia (Neanthes). ii) Feeding and digestion: a) Microphagy (Amoeba), b) Macrophagy (Hydra),c) Filter feeding (Balanoglossus) iii) Respiration: a) Ctenidium and Pulmonary sac (Pila), b) Trachea and Booklung (cockroach, scorpion). iv) Excretion: a) Flame cell (Taenia), b) Nephridia (Earthworm), Malpighian tubules (Cockroach) v) Circulation: a) Open circulation (Cockroach), b) Closed circulation (Earthworm), Haemal circulation (Starfish) vi) Neural integration: a) Integration - simple and complex			
	snail).vii) Reproduction and Life cycle: a) Fission (Amoeba), b) Conjugation (Paramoecium),e) Sexual (Earthworm), d) Metagenesis (.Obelia), e) Metamorphosis in insects			
	<b>Group B-Chordates</b> 1. Classification of Phylum Chordata with distinctive features and suitable examples- Fishes and Aves (upto Sub class); Amphibia, Reptilia and Mammalia (upto living orders). 2. a) Functional anatomy in relation to filter feeding (Branchiostoma); circulation with special reference to portal system. b) Structure and function of the following: i) Integument - general structure and function: glands in general	30	Dr. Anindya Sundar Bhunia	October'17- November'17

	(scales in fishes; horny scales and plates in reptiles; feathers of birds; hair of mammals). ii) Digestive system- pharynx (Ascidia); stomach (Columba and Bos).iii) Respiratory system - gills (fish); accessory respiratory organs (fish); lungs (birds and mammals).iv) Excretory system- pro-, meso- and meta-nephric kidneys in vertebrates. v) Circulatory system single circuit heart (fish); double circuit heart (amphibia and mammals); modification of aortic arches in vertebrates. vi) Nervous system - Brain of Bufo; origin and distribution of cranial nerves in vertebrates.			
	<b>Group C-Parasitology and</b> <b>Endocrinology</b> 1.a) Parasitism (definition and different types) b) an outline idea of other interspecific interactions (symbiosis, commensalism and mutualism).;2. Life history, pathogenecity and clinical features of i) Entamocha histolytica, ii) Plasmodium vivax, iii) Ascaris; 3. General characters of hormones.; 4. Mammalian endocrine glands (pituitary, thyroid and pancreas with their hormonal functions).	20	Dr.Indrajit Biswas	November'17- December'17
	Group D -Ecology, Ecosystem and Environment 1. Definition, components, energy flow, food chain, food web, ecological pyramids.2. Population- definition and growth,3. Community - definition and types.;4. Pollution air, water and noise.5. Global warming and its impact on environment. 6. Concept of EIA.	20	Dr. Amrita Banerjee	January'18
Part-II	Paper-II			
	<b>Group A-Evolutionary Biology</b> 1. Definition of Systematics and Taxonomy.;2. Species as unit of	30	Dr. Indrajit Biswas	July'18- January'18

evolution (definition and types: biological, monotypic and polytypic);3. Chemical basis of origin of life.;4. Darwinism and synthetic theory of evolution.;5. Hardy-Weinberg equilibrium in relation to natural selection - a brief idea.;6. Anatomical and physiological adaptation: aquatic, desert and volant animals.;7. Zoogeographical realms and their subdivisions with characteristic fauna.			
Group B-Cell and Molecular Biology 1. Ultrastucture and function of plasmamembrane, GERL system and ribosome.;2. Chromosome structure-nucleosome model.;3. Cell cycle (basic idea). ;4. Physico- chemical structure and properties of DNA and RNA.;5. Nucleic acids as genetic material.;6. Mechanism of replication, transcription and translation in E. coli ; 7. Modes of inheritance of autosomal and sex- linked genes in man; Thalassemia and Haemophilia.;8. Linkage and recombination.;9. Point mutation and changes in chromosome number with reference to chromosomal aberrations. Down syndrome and Klienfelter syndrome. 10. Sex determination in Drosophila and man.	30	Dr. Anindya Sundar Bhunia	January'18- March'18
<b>Group C-Developmental Biology</b> 1. Spermatogenesis and oogenesis.;2. Fertilization in sea- urchin.;3. Types of eggs and cleavage; process of cleavage in frog and chick;4. Gastrulation in frog and chicks; 5. Placentation in mammals.	20	Dr. Amrita Banerjee	November'17- December'17
Group D-Physiology and Biochemistry 1.Formed elements in vertebrate blood; clotting and coagulation; ABO blood group and Rh factor. 2. Enzyme classification and characteristics; mechanism of enzyme action; effects on	20	Smt. Rituparna Maity	November'17- December'17

	enzymes action (substrate concentration, pH and temperature).; 3. Classification of carbohydrate, protein and lipid; Concept of glycolysis and Kreb's cycle.; 4.Neoglucogenesis.;5.A brief idea on muscle contraction.; 6. Physiology of nerve impulse and synaptic transmission and neuromuscular junction.	50	Dr. Amrita	
			Banerjee & Dr. Anindya Sundar Bhunia	
Part-III	Paper-IV A	60	Dr. Indrajit Biswas	July'17-
	Aquaculture Principles, definition and scope. Fisheries resources of India (inland and off-shore). Exotic fishes their merits and demerits. Induced breeding and its importance. Basic principles of different aquaculture system (Polyculture and Integrated farming). Marine pearl culture, culture of prawn and shrimps; Sericulture Characteristics of sericulture industry and its scope; kinds of silk worm, host plants. Life history and rearing of Bombyx mori, harvesting and processing of cocoon, reeling and extraction of silk, pest on mulberry plants and diseases of Bombyx mori and control measures.Problems and prospects.; Apiculture Types of honey bees, modern methods of apiary management, products and its uses Pest and Pest Management – Pest – definition, types, life history and control i) Scirpophaga, ii) Sitophilus and iii) Bandicoota, Concept on IPM.; Poultry and Poultry Management – Duck and fowl – Types of breeds, rearing and disease management. Wild life and Biodiversity- 1. Conservation of Wild life- Importance and strategies, Concept of Biosphere Reserve, National Park and Wild life Sanctuary. 2. Basic concept of Biodiversity, Biodiversity			January 18

hotspot.3. Endangered Indian mammals, Animal Cruelty Prevention Act. Biotechnology and Immunology –1.Basic concept of genetic engineering and cloning;2.Concept of immunity;3.Outline structure and classification of immunoglobulin; antigen-antibody reaction; 4. Basic principle of vaccination.			
Paper-IV B- Practical	50	Dr. Indrajit Biswas, Dr. Anindya Sundar Bhunia & Smt. Jayashree Shit	January'18

## Academic Calendar Department of Zoology, HMMCW

### July, 2018 - June, 2019

A. WBSU-CBCS Syllabus for both Odd and Even Semesters

B. WBSU BSc. 3-Year Syllabus Under (1+1+1) System- Part-III & Part-III

Semester/	WBSU-CBCS Syllabus for Odd	No. of	Teacher	Distribution
Year	Semesters	Lecture	Name	Tentative
	Syllabus Module/ Unit			
SEM-I	Non Chordates-I	30		
HONOURS	PaperCode:ZOOACOR01T			
	Unit 1: Protista Parazoa and Metazoa	6	Dr. Indraiit	
	General characteristics and Classification up to	Ū	Biswas	July'18
	classes, Study of <i>Paramoecium</i> Life cycle and		2.0114.0	
	pathogenicity of Entamoeba histolytica and			
	Plasmodium vivax			
	Unit 2: Porifera	6	Dr. Indrajit	August'18
	General characteristics and Classification up to		Biswas	
	classesCanal system and spicules in sponges			
	Unit 3: Cnidaria	6	Santanu Das	July'18
	General characteristics and Classification up to			
	coral reefs: types formation distribution			
	conservation significance			
	Unit 4: Ctenophora	2	Dr. Indrajit	September'18
	General characteristics		Biswas	
	Unit 5: Platyhelminthes	5	Dr. Anindya	July'18
	General characteristics and Classification up to		Sundar	
	classes, Life cycle and pathogenicity of Fasciola		Bhunia	
	hepatica and Taenia solium			
	Unit 6: Nemathelminthes	6	Dr. Anindya	August'18
	classes Life cycle and nathogenicity of Ascaris		Sundar	
	lumbricoides. Parasitic adaptations in		Briunia	
	helminths			
	Non-Chordates I Lab Paper Code:		Dr. Indrajit	Acc. To Revised
	ZOOACOR01P	30	Biswas	Syllabus 90%
			Santanu Das	end of December
	ECOLOGY			
	PAPER CODE: ZOOACOR02T	30		
	Unit 1: Introduction to Ecology	6	Rituparna	July'18-August'18
	History of ecology, Autecology and		Maity	
	synecology, Levels of organization, Laws of			
	limiting factors, Study of Physical factors, The			
	Biosphere.	10	Bituparpa	Sentember'18-
	life tables, survivorship curves, exponential and	10	Maity	November'18
	logistic growth, r and K strategies Population		ivially	
	regulation - density-dependent and			
	independent factors			
	Unit 3: Community	5	Jayashree Shit	July'18
	Community characteristics: species diversity,	-		
	Ecological succession and example of it.			

	Unit 4: Ecosystyem	6	Jayashree Shit	August'18
	Food chain: Detritus and grazing food			
	chains,Food web, Energy flow through the			
	ecosystem, Ecological pyramids and Ecological			
	efficiencies			
	Unit 5: Applied Ecology	3	Santanu Das	Sepetember'18
	Wildlife Conservation (in-situ and ex-situ	-		
	conservation). Wild life protection act (1972)			
	ECOLOGY LAB PAPER CODE:	20	Javashree Shit	Acc. To Revised
	ZOOACOR02P	50		Syllabus 90%
				completed by
0514				end of December
SEM-I		30		
GENERAL	2009008011			
	Unit-1 Kingdom Protista	2	Dr. Indrajit	July'18
	General characters and classification of		Biswas	
	Subkingdom, Protozoa up to Phylum (Levine et			
	al., 1980)			
	Unit-2 Phylum Porifera	2	Dr. Indrajit	July'18
	General character and classification up to	-	Biswas	
	classes: Canal system in Sycon			
	Unit-3 Phylum Cnidaria	1	Dr Indraiit	August'18
	General characters and classification up to	T	Picwas	
	classes		DISWdS	
	Linit 4 Dhylum Distyholminthes	2	Dr. Indraiit	Δυσυς†'18
		3	Di. Inurajit	August 10
	General characters and classification up to		BISWas	
	classes; Life history of Taenia solium			
	Unit-5 Phylum Nematoda	3	Dr. Anindya	July 18
	General characters and classification up to		Sundar Bhunia	
	classes; Lifehistory of Ascaris lumbricoides			_
	Unit-6 Phylum Annelida	1	Dr. Anindya	August'18
	General characters and classification up to		Sundar Bhunia	
	classes			
	Unit-6 Phylum Annelida	1	Dr. Anindya	August'18
	General characters and classification up to		Sundar Bhunia	
	classes			
	Unit 7 Phylum Arthropoda	2	Dr. Anindya	Sepetember'18
	General characters and classification up to	_	Sundar Bhunia	
	classes Metamorphosis in Insects			
	Unit-8 Phylum Mollusca	2	Dr. Anindva	Sepetember'18
	General characters and classification up to	£	Sundar Bhunia	-
	classes: Respiration in Pila		Sundar Briania	
	Unit-9 Phylum Echinodermata	Э	Ritunarna	July'18
	General characters and classification up to	Z	Maity	,
	classes: Water-vascular system in Astorias		ivially	
	Linit 10 Protochardates		Diturante	Δαμε+'19
	Concred features	1	Rituparna	Agust 10
			Naity	August/10
	Unit-11 Agnatha	1	Rituparna	August 18
	General features and classification up to		Maity	
	classes (Young,1981)			
	Unit-12 Pisces	2	Rituparna	September'18
	General features and Classification up to		Maity	
	Subclasses(Romer, 1959); Osmoregulation in			
	Fishes			
	Unit-13 Amphibia	2	Santanu Das	July'18
	General features and Classification up to living	-		

	orders (Duellman & Trueb, 1986);			
	Metamorphosis in Toad			
	Unit-14 Reptiles	2	Santanu Das	Agust'18
	General features and Classification up to living	-		
	Subclass(Young, 1981); Poisonous and non-			
	poisonous snakes			
	Unit-15 Aves	2	Javashree Shit	July'18
	General features and Classification up to orders	-		
	(Young 1981): Flight adaptations in hirds			
	Unit_16 Mammals	1	Javashree Shit	Agust'18
	Classification up to Subclasses (Voung, 1981)	T	Jayasinee Sint	
	classification up to subclasses (roung, 1981)			
	ANIMAL DIVERSITY PAPER CODE: ZOOGCOR01P	30	Rituparna Maity Dr. Anindya	Acc. To Revised Syllabus 90% completed by end of December
			SundarBhunia	
SEM-II HONOURS	Non-Chordates II Paper Code: ZOOACOR03T	30		
	Unit 1: Introduction to Coelomates Evolution of coelom and metamerism	3	Dr. Indrajit Biswas	February'19
			0134403	
	Unit 2: Annelida	4	Dr. Indrajit	March'19
	General characteristics and Classification up to	-	Biswas	
	classes Excretion in Annelida			
	Unit 3: Arthropoda	8	Dr. Indrajit	April'19
	General characteristics and Classification up to		Biswas	
	classes, Metamorphosis in insects social life in bees			
	Unit 4: Onychonhora	2	Dr. Indraiit	May/19
	General characteristics	2	Biswas	ivitay 15
	Unit 5: Mollusca	6	Santanu Das	February 19- March'19
	General characteristics and classification up to			Watch 15
	in Castronada			
	In Gastropoda	4	Contonu Doc	April'19
	General characteristics and Classification up to	4	Santanu Das	April 19
	classes Water-vascular system in Asteroidea Larval			
	forms in Echinodermata			
	Unit 7: Hemichordata	3	Smt. Rituparna	February'19
	General characteristics of phylum Hemichordata.	J	Maity	
	Phylogenetic relationship with non-chordates and		inarcy	
	chordates (only recent concept)			
	Non-Chordates II Lab	30	S Dr. Indrajit	Acc. To Revised
	Paper Code: ZOOACOR03P		Biswas	Syllabus 90%
			Smt. Rituparna	completed by
			Maity	end of July
	CELL BIOLOGY	30	,	
	PAPER CODE: ZOOACOR04T	30		
	Unit 1: Overview of Cells	2	Javashree Shit	February'19
	Prokaryotic and Eukaryotic cells. Virus. Viroids	-		
	Unit 2: Plasma Membrane	5	lavashree Shit	March'19-April'19
	Various models of plasma membrane structure	5	Jayasinee Sill	
	Transport across membranes: Active and Passive			
	transport, facilitated transport, Cell junctions: Tight			
	junctions, Desmosomes, Gap junctions			

	Unit 3: Endomembrane System	5	Jayashree Shit	April'19
	Structure and Functions: Endoplasmic Reticulum,			
	Goigi Apparatus, Lysosonies	4		Fahruary (10
	Mitochondria: Structure, Semi-autonomous nature	4	Mr.Santanu	repruary 19
	Mitochondrial Respiratory Chain, Peroxisomes		Das	
	Unit 5: Cytoskeleton	4	Mr. Santanu	March'19
	Structure and Functions: Microtubules,		Das	
	Microfilaments and Intermediate filaments			
	Unit 6: Nucleus	2	Dr. Anindya	February'19
	Structure of Nucleus: Nuclear envelope, Nucleolus Chromatin: Euchromatin and Heterochromatin and		Sundar Bhunia	
	packaging (nucleosome)			
	Unit 7: Cell Division	4	Dr. Anindya	March'19
	Mitosis and Meiosis		Sundar Bhunia	
	Cell cycle and its regulation			
	Unit 8: Cell Signaling	5	Dr Anindva	April'19-Mav'19
	Cell signalling transduction pathways; Types of	·	Sundar Bhunia	r - , -
	signaling molecules and receptors GPCR and Role of			
	second messenger (cAMP)			Ass To Davised
		30	Dr. Anindya	Syllabus 90%
	FAFER CODE. 200ACOR04P		Sundar Bhunia	completed by
SEMII		20	Jayasinee Sint	end of July
GENERAL	PAPER CODE: ZOOGCOR02T	30		
•				
	Unit-1 Nerve and muscle	4	Dr. Indrajit	February'19
	1.Structure of a neuron, Resting membrane potential,		Biswas	
	Graded potential, Origin of Action potential and its			
	fibres.2.Ultra-structure of skeletal muscle, Molecular			
	and chemical basis of muscle contraction.			
	Unit-2 Digestion	2	Dr. Indrajit	March'19
	Absorption of carbonydrates, proteins, lipids	-	Biswas	
	Unit-3 Respiration	3	Dr. Anindya	February 19
	capacities, Transport of Oxygen and carbon dioxide in		Sundar Bhunia	
	blood			
	Unit-4 Excretion	3	Dr. Anindya	March'19
	Structure of nephron, Mechanism of Urine formation,		Sundar Bhunia	
	Unit-5 Cardiovascular system	3	Smt Bitunarna	February'19
	Composition of blood, Homeostasis, Structure of	5	Maity	restury 15
	Heart, Origin and conduction of the cardiac impulse,			
	Cardiac cycle			
	Unit-6 Reproduction and Endocrine Glands	4	Smt. Rituparna	March 19-April 19
	spermatogenesis; Physiology of female reproduction:		ividity	
	hormonal control of menstrual cycle. Structure and			
	function of thyroid, pancreas			
	Unit / Carbohydrate: Structure and Metabolism	4	Jayashree Shit	February 19- March' 19
	Carbohydrates, Introduction to Intermediary			
	metabolism: Glycolysis, Krebs cycle, Electron			
	transport chain	-		
	Unit-8 Lipid:	2	Mr. Santanu Das	February'19
	Introduction to Lipids: Definitions: classes of lipids: B			
	oxidation of palmitic acid			

Unit-9 Protein: Structure and metabolism Proteins and their biological functions, functions of amino acids; primary structure of protein, secondary, tertiary and quaternary structures. Transamination, Deamination.	2	Mr. Santanu Das	March'19
<b>Unit-10 Enzymes</b> Introduction, Classification of Enzymes, Mechanism of action, Enzyme Kinetics, Inhibition and Regulation	2	Mr. Santanu Das	April'19
PHYSIOLOGY AND BIOCHEMISTRY LAB PAPER CODE: ZOOGCOR02P	30	Smt. Rituparna Maity Dr. Anindya Sundar Bhunia	Acc. To Revised Syllabus 90% completed by end of July

BSC. /YEAR PART/MODULE	WBSU BSc. 3-Year Syllabus Under (1+1+1) System- Part-II & Part-III	NO OF LECTURES	NAME OF TEACHER	TENTATIVE SCHEDULE
	SYLLABUS - PAPER			
BSc. (Hons')	Paper-IV (Theory): Genetics, Cell and			
PART II	Molecular Biology, Biochemistry and			
	Biophysics			
Module 401: Genetics	<ol> <li>Significance of Mendel's experiments and laws, Concepts and examples of -Test Cross and Back Cross, Incomplete Dominance/Codominance, Multiple Alleles, Epistasis, Polygenic inheritance</li> <li>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</li> <li>Linkage and Recombination – Types and outcome, linkage disequilibrium, 3-point</li> </ol>	15	Santanu Das	August'18- October'18
Module 402: Cell	1 Units of biological measurements and	35	Dr. Anindva	lulv'18-
Biology and	microscopy	55	Sundar Bhunia	Snetember'18
Molecular Biology	<ol> <li>Plasma membrane: lipid bilayer, membrane proteins and membrane transport – brief outline</li> <li>Other organelles: introduction to structure and functions of mitochondria, GERL</li> <li>Cell Cycle: preliminary concept</li> <li>Replication: only outline of the mechanisms</li> <li>Transcription: only outline of the mechanisms</li> <li>Translation: only outline of the mechanisms</li> <li>Gene expression-lac operon, trp operon (only introductory outline of the processes)</li> <li>Types of mutations</li> <li>Transposable genetic elements (preliminary introductions</li> <li>Genetic engineering- preliminary</li> </ol>			

	12. Introductory principles of common methods used in cellular and molecular biology: PCR, RFLP, DNA fingerprinting, Gene			
Module 403: Biochemistry	<ol> <li>Chemical evolution of biomolecules         <ul> <li>(outline only)</li> </ul> </li> <li>Biological significance of water</li> <li>Structural identities of biomolecules:         <ul> <li>Carbohydrates, Amino Acids, Peptides, Lipids</li> <li>(preliminary Outlines of lipids), nucleic acids</li> <li>4. Enzymes (major classes of enzymes-mode             of actions and examples) and enzyme             kinetics</li> <li>S.Metabolic pathways: Glycolysis, HMP             shunt, Kreb's cycle, electron transfer system             (outline), Gluconeogenesis, Glycolysis, beta             oxidation,</li> </ul> </li> </ol>	30	Dr. Indrajit Biswas	September'18
Module 404: Biophysics	1.Three-dimensional structure of proteins (preliminary concepts only): peptide bonds, alpha helix, beta conformation, common examples of globular proteins;2.Structure of nucleic acids (preliminary concepts only): DNA and RNAS;3.Chromosome structure including Nucleosomes (preliminary concepts only;4.Introductory principles of common methods used in biochemistry and biophysics: Chromatography, Ultracentrifuge, Electrophoresis, X-ray crystallography, Immunoeletrophoresis & Western blotting	20	Jayashree Shit	September'18
	Paper V (Theory): Taxonomy, Ecology, Biodiversity & Microbiology, Parasitology, Immunology			
Module 501: Taxonomy and Systematics	<ol> <li>Modern definitions of taxonomy and systematics, philosophy and working of modern taxonomy, Linaean hierarchy</li> <li>Concept of a species in taxonomic practices3.ICZN and its important rules,</li> <li>Cladistics: simple introductory concept and examples</li> </ol>	10	Smt. Rituparna Maity	November'18
Module 502: Ecology	1. Ecology of populations: survivorship curves, life history tables, age-sex pyramids, population growth models (exponential and logistic models only) 2. Ecology of communities: defining a community, measuring species diversity, species interactions (competition and coexistence, predation, herbivory, mutualism), succession and concept of climaxes, Theory of Island Biogeography (introductory concepts only) 3. Ecosystems ecology: trophic structure, energy flow, nutrient cycling	30	Smt. Rituparna Maity	December'18- February'19

Module 503: Biodiversity and Wildlife Conservation Module 504:	<ol> <li>Biodiversity: concept of biodiversity, Importance of biodiversity, Megadiversity country, CBD, Indian Biodiversity Act., biodiversity hotspots, India- a megadiversity country, CBD, Indian Biodiversity Act.</li> <li>Wildlife Conservation: Major forest types and their locations in India, Major wildlife of India – their Indian distribution, present status, conservation efforts (PAs- major sanctuaries and national parks, Indian Wildlife Act, IUCN categories, Project tiger as a case study)</li> <li>The study of microbial structure, 2.</li> </ol>	15	Jayashree Shit Smt. Rituparna	November'18- December'18 December'18
Microbiology	Microbial Nutrition 3. Microbial growth 4. Control of Microorganisms by Physical and Chemical agents 5.Pathogenicity of Microorganisms 6.Human diseases caused by Virus (polio, avine influenza) Bacteria (cholera, tuberculosis), Fungi (ringworm)		Maity	
Module 505: Parasitology	<ul> <li>1.Concept of parasitism 2. Origin and evolution of parasitism, host parasitic interactions, 3.Parasitic adaptation: physiological, bio-chemical, Zoonosis, Myasis</li> <li>4.Identifying characters, life cycles, mode of infections of important parasites – Entamoeba, Giardia, Fasciola, Taenia, Ascaris</li> </ul>	15	Dr. Indrajit Biswas	December'18
Module 506: Immunology	1.What is Immunology: a short preview of the development of the subject 2.Innate (Nonspecific) and Acquired (Specific) immunity. 3.Central dogma of Immune system: (a) Cells of Immune system (b) Organs of Immune system- Primary & Secondary lymphoid organs 4.Concept of Antigen & Antigen Presentation: Antigenic determinant (for ABO and Rh group only) 5. The Major Histocompatibility Complex: Antigen processing & presentation 6.Concept of T Cell-Antigen recognition and activation [Intracellular signal transuding enzymes excluded]: Structure and function of TCR complex, APC-T Cell interaction,7.Concept of B Cell Activation and Antibody production [Intracellular signal transuding enzymes excluded]: Structure & Function of Immunoglobins [class switching among Immunoglobin gene excluded].Antigenic determinants of Immunoglobins (Isotype, Allotype & Idiotype). 8. 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).9. The Complement System (Basic concepts & Types	20	Dr. Indrajit Biswas	December'18- January'19

	only) 10. Techniques in Immunology: ELISA, RIA, Immunodiffusion Techniques,			
	Paper VI: Practicals -Group A and Group B	60+60		
BSc. (Hons')	Paper VII: Theory			
PART III				
Module 701: Animal Physiology	1. Transport across cell surface membrane, Donnan membrane equilibrium;2. Functions of mammalian blood: Oxygen transport and CO <sub>2</sub> transport;3. Neurophysiology: Generation of action potential and propagation of nerve impulse in myelinated and non-myelinated nerve fibers. Synaptic and neuro-mascular junctions: structure and functions ;4. Respiration: gill respirations in fishes, respiration in air-breathing fishes, respiration in avian lungs;5. General architecture of skeletal (striated) muscle and smooth muscle; Ultrastructure of skeletal muscle sarcomere, molecular structure of actin and myosin, Muscle contraction: sliding filament theory ;6. Swim bladder and its functions in teleost fishes;7. Water and osmotic regulations: problems in marine cyclostomes, elasmobranchs and teleosts, freshwater teleosts, in hot desert environments(camel) and examples of significant adaptations solving it by different animal groups;8. Urine formation in human kidney;9. Bioluminescence: occurrence, mechanism of production	40	Dr. Anindya Sundar Bhunia	July'18

Module 702:	1. Classification of vertebrate hormones	40	Jayashree Shit	July'18-
Endocrinology and	based on chemical nature and mechanism of	_	,	August'18
Reproductive	action (names and examples only).;2.			
biology	Hormone delivery systems: Endocrine,			
	neuroendocrine, paracrine, neurocrine,			
	autocrine (Definitions and examples only); 3.			
	Feedback control of hormone secretion:			
	negative and positive. 4. Hormone			
	biosynthesis (including sites of synthesis,			
	outlines only): Thyroid hormones (T3,			
	T4), testosterone, estrogen, progesterone,			
	adreno-cortical hormones, Insulin, Adrenal			
	catecholamines. 5. Physiologic functions of			
	hormones: Insulin, glucagon. T3 and T4.;6.			
	Hormonal control of spermatogenesis;7.			
	Hormonal control of mammalian ovarian			
	cycle, differences between estrous and			
	menstrual cycle. 8. Mechanism of hormone			
	actions (outlines only): cytoplasmic receptor,			
	nuclear receptor, membrane Receptor, HRE,			
	HSP, CAMP, cGMP, IP3-DAG, tyrosine kinase,			
	calcium-calmodulin 9. Endocrine disorders			
	(symptoms and causes only): Diabetes			
	insipidus; IDDM & NIDDM. Hypothyroidism			
	and hyperthyroidism, Conn's and Cushing's			
	syndrome.			
Modulo 702	1 Pasis tissue types: epithelial connective	20	Dr. Indrailt	Contombor'19
Histology	cardiac and nervous tissue(typical structure	20	Dr. murajit	September 10
Thistology	of neuron and types of neuron, dial cells		Biswas	
	etc).2 Membrane specializations of enithelia			
	(Intercellular surface [cell junctions] luminal			
	surfaces and Basal surfaces ) · 3 Exocrine			
	glands: Types and discharge of secretory			
	products (merocrine apocrine			
	holocrine) ·4 Principles of tissue fixation			
	staining :5 Histology of: stomach_pancreas			
	testis ovary thyroid lymph node (Outline			
	of structures) 6. Histological structure of			
	mammalian penbron and functions of each			
	regions.			
	Paper VIII: Theory			
Module 801:	1.Outlines of historical concepts and	30	Santanu Das	July'18-
Developmental	experiments in the emergence of		2	
Biology	developmental biology- Induction.Fate man			August 10
01	Spemann and Mangold's organizer			
	transplant experiments, von Baer's laws. 2			
	Germ layers and its contributions to the			
	development of different tissues in			
	vertebrates;. 3.Origin of germ cells.			
	Structural features of sperms and eggs in sea			
	urchins and in mammals.Gametogenesis in			
	mammals,; 4. Fertilization: external			
	fertilization in sea urchins, internal			
	fertilization in mammals (in depth molecular			

	Details not required); 5.Cleavage Types of cleavage found in animals and animal groups that exhibit a type, outlines of cleavage process in C . elegans, Zebrafish and Xenopus and chick; 6.Gastrulation: generalized patterns, brief outlines of the process in C. elegans, Zebra fish, Xenopus and chick ;7.Organogenesis: development of brain in chicken; 8. Conceptual outlines (very brief) of – Cell potency and Stem Cells, Sex determination in Drosophila and Man, Environmental sex determination in reptiles. HOX genes in development			
Module 802:	1. Environmental pollutions (nature and	20	Rituparna	July'18
Environmental Pollutions and Toxicology	sources of pollutants. Impacts on ecosystems and humans, remedies): water, soil, air and sound pollutions;2.Environmental laws: major ones applicable in West Bengal;3.Toxicology: including its significance as a branch of Science;4.Dose-response relationships;5.In vivo and In vitro toxicity test;6.Introduction to the concepts of detoxication mechanisms		Maity	
Module 805: Medical Zoology	1. Mosquito-borne diseases: Malaria and Filaria- causative agents, their life cycle, modes of infections in man, major modes of treatments, major vector species in India, their ecology and life cycles, control	15	Dr. Indrajit Biswas	November'18
	measures; 2. Mosquito-borne diseases: Dengue and DHF, Chikungunya- causative virus, symptoms and treatments;3. Visceral Leishmaniasis (Kala-azar)- causative species and vectors in West Bengal; 4. Common ticks and mites in human surroundings and diseases caused by them			
Module 806:	1. Fishes and fishery: diversity of indigenous	40	Dr. Indrajit	December'18
Economic Zoology	freshwater, estuarine, marine fishes and shell fishes in West Bengal. Invasive and exotic species of fishes in West Bengal. Techniques of modern pisciculture and prawn culture. Problems related to wild prawn seed collections in Sunderbans, fish productivities in India and West Bengal, ecology and degradation of freshwater fish habitats and decrease in wild fish stocks (very brief idea); 2. Sericulture: silks and silk worms, sericulture practices- methods, scopes and problems; 3. Apiculture: Honey bees and their behaviours in relation to bee- keeping, popular methods of bee keeping, scopes and problems; 4. Lac culture: Lac and lac insects, host plants and lac cultivation, scopes and problems; 5. Poultry birds: different breeds, their advantages and disadvantages, importance of indigenous broads 6. Cattle, goats and lambs: different		Biswas Rituparna Maity	

	breeds, their advantages and disadvantages, importance of Indigenous breeds			
	Paper IX: Practical Group A Group B	60+60	Dr. Anindya sundar bhunia Dr. Indrajit Biswas	
			Jayashree Shit	
BSc. (General)	Paper-II			
Part-II				
	<b>Group A-Evolutionary Biology</b> 1. Definition of Systematics and Taxonomy.;2. Species as unit of evolution (definition and types: biological, monotypic and polytypic);3. Chemical basis of origin of life.;4. Darwinism and synthetic theory of evolution.;5. Hardy-Weinberg equilibrium in relation to natural selection - a brief idea.;6. Anatomical and physiological adaptation: aquatic, desert and volant animals.;7. Zoogeographical realms and their subdivisions with characteristic fauna.	30	Dr. Indrajit Biswas	July'18
	<b>Group B-Cell and Molecular Biology</b> 1. Ultrastucture and function of plasmamembrane, GERL system and ribosome.;2. Chromosome structure- nucleosome model.;3. Cell cycle (basic idea). ;4. Physico-chemical structure and properties of DNA and RNA.;5. Nucleic acids as genetic material.;6. Mechanism of replication, transcription and translation in E. coli ; 7. Modes of inheritance of autosomal and sex- linked genes in man; Thalassemia and Haemophilia.;8. Linkage and recombination.;9. Point mutation and changes in chromosome number with reference to chromosomal aberrations. Down syndrome and Klienfelter syndrome. 10. Sex determination in Drosophila and man.	30	Dr. Anindya Sundar Bhunia	August'18
	<b>Group C-Developmental Biology</b> 1. Spermatogenesis and oogenesis.;2. Fertilization in sea-urchin.;3. Types of eggs and cleavage; process of cleavage in frog and chick;4. Gastrulation in frog and chicks; 5. Placentation in mammals.	20	Jayashree Shit	July'18
	<b>Group D-Physiology and Biochemistry</b> 1.Formed elements in vertebrate blood; clotting and coagulation; ABO blood group and Rh factor. 2. Enzyme classification and characteristics; mechanism of enzyme action; effects on enzymes action (substrate concentration, pH and temperature).; 3. Classification of carbohydrate, protein and	20	Rituparna Maity	September'18

	lipid; Concept of glycolysis and Kreb's cycle.; 4.Neoglucogenesis.;5.A brief idea on muscle contraction.; 6. Physiology of nerve impulse			
	neuromuscular junction.			
Part-III	Paper-IV A	60		
	Aquaculture Principles, definition and scope. Fisheries resources of India (inland and off- shore). Exotic fishes their merits and demerits. Induced breeding and its importance. Basic principles of different aquaculture system (Polyculture and Integrated farming). Marine pearl culture, culture of prawn and shrimps; Sericulture Characteristics of sericulture industry and its scope; kinds of silk worm, host plants. Life history and rearing of Bombyx mori, harvesting and processing of cocoon, reeling and extraction of silk, pest on mulberry plants and diseases of Bombyx mori and control measures.Problems and prospects.; Apiculture Types of honey bees, modern methods of apiary management, products and its uses Pest and Pest Management – Pest – definition, types, life history and control i) Scirpophaga, ii) Sitophilus and iii) Bandicoota, Concept on IPM.; Poultry and Poultry Management – Duck and fowl – Types of breeds, rearing and disease management. Wild life and Biodiversity- 1. Conservation of Wild life Importance and strategies, Concept of Biosphere Reserve, National Park and Wild life Sanctuary. 2. Basic concept of Biodiversity, Biodiversity hotspot.3. Endangered Indian mammals, Animal Cruelty Prevention Act. Biotechnology and Immunology –1.Basic concept of genetic engineering and cloning;2.Concept of immunity;3.Outline structure and classification of immunoglobulin; antigen-antibody reaction;	60	Dr. Indrajit Biswas	July'18- September'18
	Paper-IV B- Practical	60	Dr. Indraiit	September'18-
	raper-iv D- Flactical	50	Biswas	December'18

### Academic Calendar

### Department of Zoology, HMMCW

July, 2019 - June, 2020

A. WBSU-CBCS Syllabus for both Odd and Even Semesters

B. WBSU BSc. 3-Year Syllabus Under (1+1+1) System- Part-III

Semester/	WBSU-CBCS Syllabus for Odd Semesters	No. of	Teacher	Distribution
Year	Syllabus Module/ Unit	Lecture	Name	Tentative
SEM-I	Non-Chordates I	30		
HONOURS	Paper Code: ZOOACOR01T			
	Unit 1: Protista. Parazoa and Metazoa	6	Dr. Indraiit	
	General characteristics and Classification up to classes.	Ŭ	Biswas	
	Study of <i>Paramoecium</i> Life cycle and pathogenicity of		2.0.1.00	June'20-July'20
	Entamoeba histolytica and Plasmodium vivax			July'20-July'20
	Unit 2: Porifera	5	Dr. Indraiit	August'20
	General characteristics and Classification up to classes	5	Biswas	
	Canal system and spicules in sponges		DISWas	
		<u> </u>	Contonu Doo	August'20
	Unit 3: Chidaria	6	Santanu Das	October'20
	General characteristics and Classification up to classes			
	formation distribution conservation significance			
	Unit 4: Ctopophero	2	Santanu Dac	lulv/20-Διισμεt/20
	Conoral characteristics	2	Santanu Das	July 20 August 20
	Unit 5: Platyhelminthes	6	Dr. Anindya	August'20- Sentember'20-
	General characteristics and Classification up to classes, Life		Sundar	September 20
	cycle and pathogenicity of <i>Fasciola hepatica</i> and <i>Taenia</i>		Bhunia	
	solium	-	Du Animalua	lung'20 lung'20
	Unit 6: Nematheiminthes	5	Dr. Anindya	June 20-June 20
	General characteristics and Classification up to classes, Life		Sundar	
	cycle, and pathogenicity of Ascaris lumbricoides, Parasitic		Bhunia	lupo'20 luby'20
	Non Chardatas II ab	20	Dr. Indrailt	Acc. To Revised
	Paper Code: 7004C0P01P	30	Biswas	Syllabus 90%
	Faper Code. 200ACORUTE		Santanu Das	completed by
				end of November
	ECOLOGY	30		August'20
	PAPER CODE: ZOOACOR02T			5
	Unit 1: Introduction to Ecology	6	Rituparna	August'20-
	History of ecology. Autecology and synecology.	Ŭ	Maity	October'20
	Levels of organization Laws of limiting factors. Study			
	of Dhysical factors. The Piesphere			
	Unit 2: Deputation	40	Diturgence	lub/20 August/20
	Unit 2: Population	10	Rituparna	July 20-August 20
	are utback, survivorship curves, exponential and logistic		waity	
	dependent and independent factors			Sentember'20-
	Unit 2: Community	5	Dr S Pehan	September'20
	Community characteristics: species diversity, abundance	J	Δhmad	
	dominance richness Ecotope Ecological succession and		Annau	
	example of it.			
	Unit 4: Ecosystvem	6	Dr. S Rehan	June'20-
	Food chain: Detritus and grazing food chains Food web		Ahmad	June'20
	Energy flow through the ecosystem. Ecological pyramids		,	
	and Ecological efficiencies			

	Unit 5: Applied Ecology	3	Santanu Das	August'20
	Wildlife Conservation (in-situ and ex-situ conservation).			
	Wild life protection act (1972)			
	ECOLOGY LAB	30	Rituparna	Acc. To Revised Syllabus 90%
	PAPER CODE: ZOOACOR02P		Maity	completed by
				end of November
SEM-I	ANIMAL DIVERSITY	30		ornovember
GENERAL	PAPER CODE: ZOOGCOR01T			
	Unit-1 Kingdom Protista	2	Dr. Indraiit	June'20
	General characters and classification of Subkingdom	_	Biswas	
	Protozoa up to Phylum (Levine et al., 1980)			
	Unit-2 Phylum Porifera	2	Dr. Indrajit	June'20-July'20
	General character and classification up to classes; Canal		Biswas	
	System in Sycon			
	Unit-3 Phylum Cnidaria	1	Dr. Indrajit	July'20-July'20
	General characters and classification up to classes		Biswas	
	Unit-4 Phylum Platyhelminthes	3	Dr. Indrajit	August'20
	General characters and classification up to classes; Life		Biswas	
	history of Taenia solium			
	Unit-5 Phylum Nematoda	3	Dr. Anindya	June'20- July'20
	General characters and classification up to classes; Life		Sundar	July 20
	history of Ascaris lumbricoides		Bhunia	
	Unit-6 Phylum Annelida	1	Dr. Anindya	August'20-
	General characters and classification up to classes		Sundar	
	Linit C Division Annualisia	4	Bnunia	Sontombor'20
	Unit-6 Phylum Annelida	1	Dr. Anindya	September 20
	General characters and classification up to classes;		Sundar	
	Linit 7 Phylum Arthronoda	2	Dr. Anindva	October'20
	General characters and classification up to classes	<b>_</b>	Sundar	
	Metamorphosis in Insects		Bhunia	
	Unit-8 Phylum Mollusca	2	Dr. Anindva	November20
	General characters and classification up to classes:	_	Sundar	
	Respiration in Pila		Bhunia	
	Unit-9 Phylum Echinodermata	2	Rituparna	June'20-July'20
	General characters and classification up to classes; Water-		Maity	
	vascular system in Asterias			
	Unit-10 Protochordates	1	Rituparna	July'20-July'20
	General features		Maity	
	Unit-11 Agnatha	1	Rituparna	August'20
	General features and classification up to classes (Young,		Maity	
	1901)	2	Dituporpo	August'20-
	Concral features and Classification up to Subclasses	2	Maity	August 20
	(Romer, 1959): Osmoregulation in Fishes		ivially	
	Unit-13 Amphibia	2	Santanu Das	September'20
	General features and Classification up to living orders	-		
	(Duellman & Trueb, 1986); Metamorphosis in Toad			
	Unit-14 Reptiles	2	Santanu Das	November'20
	General features and Classification up to living Subclass			
	(Young, 1981); Poisonous and non- poisonous snakes			
	Linit-15 Aves	2	Dr SRehan	June'20-July'20
	General features and Classification up to orders (Young	<b>_</b>	Ahmad	
	1981); Flight adaptations in birds			
	Unit-16 Mammals	1	Dr. S Rehan	July'20-July'20
	Classification up to Subclasses (Young, 1981)		Ahmad	

	ANIMAL DIVERSITY	30	Rituparna Maity	Acc. To Revised
			Dr. Anindya	Syllabus 90% completed
			Sundar	by end of November
SEM-III	CHORDATES	60	Bhunia	or November
HONOURS	PAPER CODE: ZOOACOR05T			
	Unit 1: Introduction to Chordates	4	Rituparna	June'20-July'20
	General characteristics and outline classification of Phylum		Maity	
	Chordata			
	Unit 2: Protochordata	8	Rituparna	July 20-July 20
	Urochordata and Cephalochordata up to Classes.		watty	
	Metamorphosis in Ascidia Chordate Features and Feeding in			
	Branchiostoma			
	Unit 3: Origin of Chordata	5	Rituparna	August 20
	chordates Advanced features of vertebrates over		Waity	
	Protochordata			
	Unit 4: Agnatha	2	Rituparna	August'20-
	General characteristics and classification of cyclostomes up		Maity	
	to order			Contractor
	Unit 5: Pisces	10	Rituparna	November
	and Osteichthyes up to Subclasses Accessory respiratory		Waity	
	organ, Advanced features of vertebrates over			
	Protochordata, migration and parental care in fishes Swim			
	bladder in fishes. Classification up to Sub- Classes	5	Dr. S. Bohan	lune'20-lulv'20
	Onit 6: Amphibia General characteristics and classification up to living Orders	5	Ahmad	June 20 July 20
	Metamorphosis with parental care			
	Unit 7: Reptilia	7	Dr. S Rehan	July'20-July'20
	General characteristics and classification up to living Orders		Ahmad	
	Poison apparatus and Biting mechanism in Snake			August/20
	Unit 8: Aves General characteristics and classification up to Sub-Classes	1	Dr. S Renan Ahmad	August 20
	Exoskeleton and migration in Birds, Principles and		, innuu	
	aerodynamics of flight			
	Unit 9: Mammals	10	Dr. S Rehan	September'20 November'20
	General characters and classification up to living orders,		Ahmad	
	Exoskeleton derivatives of mammals			
	Adaptive radiation in mammals with reference to			
	locomotory appendages Echolocation in			
	Unit 10: Zoogeography	2	Dr. S Rehan	November'20
	Zoogeographical realms,-Plate tectonic and Continental	-	Ahmad	
	drift theory, Distribution of birds and mammals in different			
		60	Contant D-	Acc. To Revised
		UØ	Rituparna	Syllabus 90%
			Maity	completed by end of November
	PHYSIOLOGY	60		
	PAPER CODE: ZOOACOR06T			

Unit 1: Tissues	10	Dr. Indrajit	June'20-July'20
Structure, locations, classification and functions of		Biswas	
epithelial tissues, connective tissues, muscular tissues and			
nerve tissues			
Unit 2: Bone and Cartilage	5	Dr. Indrajit	July'20-July'20
Structure and types of bones and cartilages, Ussification		Biswas	
Unit 3: Nervous System	15	Dr. Indrajit	September'20
Structure of neuron, resting membrane potential, Origin of		Biswas	
action potential and its propagation across the myelinated			
transmission and Neuromuscular junction Beflex action and			
its types			
Unit 4: Muscular system	10	Santanu Das	June'20-July'20
Histology of different types of muscle; Ultra structure of	-		
skeletal muscle; Molecular and chemical basis of muscle			
contraction,-Characteristics of muscle fiber			
Unit 5: Reproductive System	5	Santanu Das	August'20
Histology of testis and ovary; Physiology of Reproduction			
Unit 6: Endocrine System	15	Dr. S Rehan	June'20-July'20
Histology and function of pituitary, thyroid, Pancreas, and		Ahmad	
Aurenal. Classification of hormones; Mechanism of			
and Non-steroidal hormones: Hypothalamus			
(neuroendocrine gland) - principal nuclei involved in			
neuroendocrine control of anterior pituitary and endocrine			
system; Placental hormones			
PHYSIOLOGY LAB	60	Dr. Anindya	Acc. To Revised
PAPER CODE: ZOOACOR06T		Sundar	completed by end
		Bhunia	of November
		Dr. S Renan	
BIOCHEMISTRY	60	Annad	
PAPER CODE: ZOOACOR07T			
Unit 1: Fundamentals of biochemical reactions and	10	Dr. S Rehan	September'20
metabolism		Ahmad	November'20
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			
Unit 2: Carbohydrates	10	Dr. S Rehan	August'20
Structure and Biological importance:		Anmad	
Monosaccharides, Disaccharides, Polysaccharides;			
perivatives of Monosacrinarides, Carbonydrate			
phosphate pathway. Gluconeogenesis			
Unit 3: Linids	4	Dr. S Rehan	August'20
Structure and Significance: Physiologically important	•	Ahmad	September'20
saturated and unsaturated fatty acids. Triacylolycerols			
Phospholinide Sphingolinid Glycolinide Storoide			
Ficosanoids and terninoids. Linid metabolism: 6 ovidation			
of fatty acids: Fatty acid biosynthesis			
or racey actually actual biosynchesis		1	

	<b>Unit 4: Proteins</b> Amino acids Structure, Classification, General and Electro chemical properties of $\alpha$ -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	14	Dr. Anindya Sundar Bhunia	June'20- July'20
	Unit 5: Nucleic Acids Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids Types of DNA and RNA, Complementarity of DNA,-Hypo- Hyperchromaticity of DNA Outlines of nucleotide metabolism	4	Dr. Indrajit Biswas	September'20 November'20
	Unit 6: Enzymes 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)	12	Dr. Anindya Sundar Bhunia	August'20 September'20
	Unit 7: Oxidative Phosphorylation Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System	6	Dr. Anindya Sundar Bhunia	September'20 November'20
	BIOCHEMISTRY LAB PAPER CODE: ZOOACOR07T	60	Dr. Anindya Sundar Bhunia Dr. S Rehan Ahmad	Acc. To Revised Syllabus 90% completed by end of November
SEM-III GENERAL	INSECT VECTOR AND DISEASES PAPER CODE: ZOOGCOR03T	60		
	<b>Unit-1 Introduction to Insect</b> s General Features of Insects, Morphological features, Head – Eyes, Types of antennae Mouth parts with respect to feeding habit	4	Dr. Indrajit Biswas	June'20-July'20
	Unit-2 Concept of Vectors Brief introduction to Vectors (mechanical and biological), Reservoirs, Host-vector relationship, Adaptations as vectors, Host specificity	6	Dr. Anindya Sundar Bhunia	June'20-July'20
	Unit-3 Insects as Vectors Detailed features of insect orders as vectors – Diptera, Siphonoptera, Siphunculata, Hemiptera	6	Dr. S Rehan Ahmad	June'20-July'20
	Unit-4 Dipteran as Disease Vector Study of important Dipteran vectors – Mosquitoes, Sand fly, Houseflies vectors Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis Control of mosquitoes	16	Rituparna Maity	June'20-July'20
	Unit-5 Siphonaptera as Disease Vectors Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas	10	Rituparna Maity	August'2 0 Novemb er'20
	Unit-6 Siphunculata as Disease Vectors Human louse (Head, Body and Pubic louse) as important insect vectors; Control of human louse	8	Santanu Das	June'20- July'20

Unit-7 Hempitera as Disease Vectors Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures	10	Santanu Das	September'20- November'20
INSECT VECTORE AND DISEASES PAPER CODE: ZOOGCOR03P	60	Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by end of November

Semester/	WBSU-CBCS Syllabus for Even Semesters	No. of	Teacher	Distribution
Year	Syllabus Module/ Unit	Lecture	Name	Tentative
SEM-II HONOURS	Non-Chordates II Paper Code: ZOOACOR03T	30		
	Unit 1: Introduction to Coelomates Evolution of coelom and metamerism	3	Dr. Indrajit Biswas	1st week February
	Unit 2: Annelida General characteristics and Classification up to classes Excretion in Annelida	4	Dr. Indrajit Biswas	2 <sup>nd</sup> week March
	Unit 3: Arthropoda General characteristics and Classification up to classes, Metamorphosis in Insects Social life in bees and termites	8	Dr. Indrajit Biswas	3rd Week of April
	Unit 4: Onychophora General characteristics	2	Dr. Indrajit Biswas	1 <sup>st</sup> week of June
	Unit 5: Mollusca General characteristics and Classification up to classes Respiration in Mollusca Torsion and detorsion in Gastropoda	6	Santanu Das	1 <sup>st</sup> week of May- 3rd week of May
	Unit 6: Echinodermata General characteristics and Classification up to classes Water-vascular system in Asteroidea Larval forms in Echinodermata	4	Mr. Santanu Das	4 <sup>th</sup> week of May – 1 <sup>st</sup> week of June
	Unit 7: Hemichordata General characteristics of phylum Hemichordata. Phylogenetic relationship with non-chordates and chordates (only recent concept)	3	Smt. Rituparna maity	1 <sup>st</sup> week of May- 4 <sup>th</sup> week of May
	Non-Chordates II Lab Paper Code: ZOOACOR03P	30	Dr. Indrajit Biswas Smt. Rituparna Maity	Acc. To Revised Syllabus 90% completed by end of July
	CELL BIOLOGY PAPER CODE: ZOOACOR04T	30		Acc. To Revised Syllabus 90% completed by end of November
	Unit 1: Overview of Cells Prokaryotic and Eukaryotic cells, Virus, Viroids	2	Dr. S Rehan Ahmad	1 <sup>st</sup> week of March
	Unit 2: Plasma Membrane Various models of plasma membrane structure Transport across membranes: Active and Passive transport, facilitated transport, Cell junctions: Tight junctions, Desmosomes, Gap junctions	5	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of May- 1 <sup>st</sup> week of June
	Unit 3: Endomembrane System Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes	4	Dr. S Rehan Ahmad	end of April

	Unit 4: Mitochondria and Peroxisomes Mitochondria: Structure, Semi-autonomous nature, Mitochondrial Respiratory Chain, Peroxisomes	4	Mr.Santanu Das	2 <sup>nd</sup> week of aPRIL-3 <sup>rd</sup> week of June
	Unit 5: Cytoskeleton Structure and Functions: Microtubules, Microfilaments and Intermediate filaments	2	Mr. Santanu Das	1st week of April
	Unit 6: Nucleus Structure of Nucleus: Nuclear envelope, Nucleolus Chromatin: Euchromatin and Heterochromatin and packaging (nucleosome)	4	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of February
	Unit 7: Cell Division Mitosis and Meiosis Cell cycle and its regulation Mechanisms of cell death: brief overview	5	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of March- End of April
	Unit 8: Cell Signaling Cell signalling transduction pathways; Types of signaling molecules and receptors GPCR and Role of second messenger (cAMP)	4	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of June
	CELL BIOLOGY LAB PAPER CODE: ZOOACOR04P	30	Dr. Anindya Sundar Bhunia Dr. S Rehan Ahmad	Acc. To Revised Syllabus 90% completed by end of June
SEM-II GENERAL	PHYSIOLOGY AND BIOCHEMISTRY PAPER CODE: ZOOGCOR02T	30		
	Unit-1 Nerve and muscle 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.	4	Dr. Indrajit Biswas	1 <sup>st</sup> week of May- End of March
	Unit-2 Digestion Absorption of carbohydrates, proteins, lipids	2	Dr. Indrajit Biswas	1st week of june
	Unit-3 Respiration Pulmonary ventilation, Respiratory volumes and capacities, Transport of Oxygen and carbon dioxide in blood	3	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May- End of May
	Unit-4 Excretion Structure of nephron, Mechanism of Urine formation, Counter- current Mechanism	3	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of July- End of July
	Unit-5 Cardiovascular system Composition of blood, Homeostasis, Structure of Heart, Origin and conduction of the cardiac impulse, Cardiac cycle	3	Smt. Rituparna maity	1 <sup>st</sup> week of May- End of April
	Unit-6 Reproduction and Endocrine Glands Physiology of male reproduction: hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle. Structure and function of thyroid, pancreas	4	Smt. Rituparna maity	1 <sup>s⊤</sup> week of June- 1 <sup>st</sup> week of July
	Unit 7 Carbohydrate: Structure and Metabolism Introduction to Carbohydrates, Structure & Types of Carbohydrates, Introduction to Intermediary metabolism: Glycolysis, Krebs cycle, Electron transport chain	4	Dr. S Rehan Ahmad	1 <sup>st</sup> week of May- End of May
	Unit-8 Lipid: Structure and Metabolism Introduction to Lipids: Definitions; classes of lipids; $\beta$ oxidation of palmitic acid	2	Dr. S Rehan Ahmad	1 <sup>st</sup> week of July
	Unit-9 Protein: Structure and metabolism Proteins and their biological functions, functions of amino acids; primary structure of protein, secondary, tertiary and quaternary structures. Transamination, Deamination.	2	Mr. Santanu Das	1 <sup>st</sup> week of May

	Unit-10 Enzymes 4	2	Mr. Santanu	3 <sup>rd</sup> week of May
	Introduction, Classification of Enzymes, Mechanism of		Das	
	action, Enzyme Kinetics, Inhibition and Regulation			
	PHYSIOLOGY AND BIOCHEMISTRY LAB	30	Smt.	Acc. To Revised
	PAPER CODE: ZOOGCOR02P		Rituparna	completed by end
			Maity	of July
			Dr. Anindya	
			Sundar	
			Bhunia	
SEM-IV	COMPARATIVE ANATOMY	30		
HONOURS	PAPER CODE: ZOOACOR08T			
	Unit 1: Integumentary System- Structure, function and	5	Santanu Das	1st week of May-
	derivatives of integument in mammals	_		End OI
	мау			
	Unit 2: Skeletal System, Jaw Suspension	-	Santanu Das	1st week of june
		2	Santana Das	_
	Unit 3: Digestive System- Comparative anatomy of stomach;		Smt.	1st week of May-
	dentition in mammals	4	Rituparna	3rd week of May
		-	maity	
	Unit 4: Respiratory System- Respiratory organs in birds		Smt	4th week of Mav-
			Dituparpa	2nd week of June
		4	Rituparita	
			maity	
	Unit 5: Circulatory System- Comparative account of heart and	4	Dr. S Rehan	1st week of May- 3rd week of May
	aortic arches	•	Ahmad	Sid week of May
	Unit 6: Urinogenital System- Succession of kidney	2	Dr. S Rehan	3rd week of May-
		5	Ahmad	1st week of June
	Unit 7: Nervous System Comparative account of brain, Cranial	_	Dr. Indrajit	1st week of May-
	nerves in mammals	4	Biswas	End of May
	Unit 8: Sense Organs Classification of receptors		Dr. Indraiit	1st week of June-
		4	Biswas	2nd week of june
		20	Mr. Santanu	Acc. To Revised
	CONPARATIVE ANATOMY LAB	30		Syllabus 90%
			Das	completed by end
		20		of July
		30		
	PAPER CODE: 200ACOR091			2nd week of lune
	Unit 1: Physiology of Digestion-Mechanical and chemical	4	Dr. S Renan	3 <sup>rd</sup> week of June
	digestion of food, absorption of Carbohydrates, Lipids, Proteins,		Anmad	
	Digestive enzyme			
	Unit 2: Physiology of Respiration- Mechanism of Respiration,	6	Dr. S Rehan	3 <sup>rd</sup> week of June-
	Respiratory volumes and capacities, transport of Oxygen and		Ahmad	1 <sup>st</sup> week of July
	Carbon dioxide in blood, Dissociation curves and the factors			
	Unit 3: Physiology of Circulation- Components of Blood and	Λ	Dr Anindua	1 <sup>st</sup> week of May-
	their functions: Structure and functions of haemoglobin: Blood	4	DI. Aninuya Sundar	3 <sup>rd</sup> week of May
	clotting system, Blood groups; ABO and Rh factor		Bhunia	
	Unit 4: Physiology of Heart-Structure of mammalian heart	6		4 <sup>th</sup> week of May-
	Origin and conduction of cardiac impulses: Cardiac Cycle and	U	Sundar	2 <sup>nd</sup> week of June
	cardiac output; Blood pressure and its regulation		Bhunia	
	Unit 5: Thermoregulation & Osmoregulation Physiological	Λ	Cmt	3 <sup>rd</sup> week of June-
	classification based on thermal biology. Thermal biology of	-	Ritunarna	1 <sup>st</sup> week of July
	endotherms; Osmoregulation in aquatic vertebrates;		maity	
	Unit 6: Renal Physiology Structure of Kidney and its functional	6	Smt	1 <sup>st</sup> week of Julv-
	unit, Mechanism of urine formation, Regulation of acid-base		Ritunarna	4 <sup>th</sup> week of July
	balance		maity	
			marty	
PHYSIOLOGY: LIFE SUSTAINING SYSTE	M 30	Dr. Anindya	Acc. To Revised	
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LAB		Sundar	Syllabus 90%	
PAPER CODE: ZOOACOR09T		Bhunia	of July	
		Smt.Rituparna	,	
		Maity		
IMMUNOLOGY	30			
PAPER CODE: ZOOACOR10T				
Unit 1: Overview of Immune System-Organs (Primary &	1	Dr. Indrajit	3 <sup>rd</sup> week of June	
Secondary lymphoid organs and its importance) and cells of	the	Biswas		
			and to the	
Unit 2: Innate and Adaptive Immunity	5	Dr. Indrajit	3 <sup>rd</sup> week of June- 2 <sup>nd</sup> week of July	
Principle of Innate and Adaptive Immunity.		Biswas		
Components of innate immunity				
– Epithelial barriers (skin and mucosal				
membranes [concept])				
<ul> <li>Cellular mechanisms (phagocytes, NK cells, mast</li> </ul>				
cells, eosinophils, inflammation [concept])				
<ul> <li>Humoral mechanisms (complement, cytokines,</li> </ul>				
chemokines etc. [concept])				
Components of adaptive immunity				
<ul> <li>Cellular mechanisms (Cell-Mediated Immune</li> </ul>				
System (CMIS) or T-Cell Immunity [concept])				
<ul> <li>Humoral mechanisms (Formation of Plasma B</li> </ul>				
cells and Memory B cells [concept])				
Unit 3: Antigen, Antigen presentation & MHC Concep	t of <b>4</b>	Dr. Anindya	3 <sup>rd</sup> week of June-	
Antigen, Immunogen, Allergen & Pathogen. Adjuvar	ts	Sundar	Life of June	
and haptens, Factors influencing immunogenicity,		Bhunia		
Epitope. Types of Antigen Presenting Cells (APC), Co	)-			
stimulatory molecules on APC.				
Unit 4: T Cell development Structure of T cell recepto	ors, <b>4</b>	Dr. Anindya	3 <sup>rd</sup> week of July-	
Co-stimulatory molecules on L cells, Central		Sundar	5 week of July	
differentiation of Leelis; Leeli selection in thymus		Bhunia		
Peripheral differentiation of L cells; In1 & In2			2nd wook of	
Unit 5: Immunoglobulins Structure and functions of	. 4	Mr.Santanu	June-4th week of	
different classes of immunoglobulins, Antigen- antibo	dy	Das	June	
interactions, Immunoassays (ELISA and RIA), Hybridon	าล			
technology, Wonocional antibody production	f -		End of June 2nd	
Unit 6: Cytokines & Chemokines Brief concept on type	s or <b>4</b>	Ivir. Santanu	week of July	
Cytokines & Chemokines Cytokines (source & function	OT	Das	,	
IL-1, IL-2, IL-4, IL-5, IL-6, IL-8, IL-10, IL-12, Interferons,				
Tumor Necrosis Factors, Tumor Growth Factors, GMC	ъг,			
Init 7: Complement System	^	C mat	End of July	
Components and pathways of complement activation	2	Siiit.		
		Rituparita		
Linit 9: Hypercensitivity	2	Smt	End of July	
Gell and Coombs' classification and brief description of vario		Siiit.		
types of hypersensitivities.		maitu		
Linit 0: Immunology of diseases		Cm+	End of July	
Malaria, Visceral Leishmaniasis Filariasis Dengue and	<b>∠</b>	Dituparpa	Lind of July	
Tuberculosis.		maity		
Linit 10: Vaccines			2 <sup>nd</sup> week of July	
Various types of varcines Active & passive immunization	2		2 week of July	
(Artificial and natural).		AIIIIdu		

SEM-IV GENERAL	ENVIRONMENT AND PUBLIC HEALTH PAPER CODE: ZOOGCOR04T	30		
	Unit 1: Introduction Sources of Environmental hazards, Hazard identification and accounting, Fate of toxic and persistent substances in the environment, Dose response evaluation, Exposure assessment	8	Dr. Indrajit Biswas	1 <sup>st</sup> week of May- End of July
	Unit 2: Climate Change Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health	6	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week May-end of June
	Unit 3: Pollution Air, water pollution: sources and effects, Pollution control	8	Smt. Rituparna Maity	1 <sup>st</sup> week of May- End of July
	Unit 4: Waste Management Technologies Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal.	4	Dr. S Rehan Ahmad	1st week of May- End of June
	Unit 5: Diseases Causes, symptoms and control of tuberculosis, Asthma, Cholera.	2	Mr Santanu Das	1 <sup>st</sup> week of May- 4 <sup>th</sup> week of May
	ENVIRONMENT AND PUBLIC HEALTH PAPER CODE: ZOOGCOR04P	30	Dr. Indrajit Biswas Dr. S Rehan Ahmad	Acc. To Revised Syllabus 90% completed by end of July

BSC. /YEAR PART/MODULE	WBSU BSc. 3-Year Syllabus Under (1+1+1) System- Part-III SYLLABUS - PAPER	NO OF LECTURES	NAME OF TEACHER	TENTATIVE SCHEDULE
BSc. (Hons')	Paper VII: Theory			
PART-III				
Module 701: Animal Physiology	1. Transport across cell surface membrane, Donnan membrane equilibrium;2. Functions of mammalian blood: Oxygen transport and CO <sub>2</sub> transport;3. Neurophysiology: Generation of action potential and propagation of nerve impulse in myelinated and non-myelinated nerve fibers. Synaptic and neuro-mascular junctions: structure and functions ;4. Respiration: gill respirations in fishes, respiration in air-breathing fishes, respiration in avian lungs;5. General architecture of skeletal (striated) muscle and smooth muscle; Ultrastructure of skeletal muscle sarcomere, molecular structure of actin and myosin, Muscle contraction: sliding filament theory ;6. Swim bladder and its functions in teleost fishes;7. Water and osmotic regulations: problems in marine cyclostomes, elasmobranchs and teleosts, freshwater teleosts, in hot desert environments(camel) and examples of significant adaptations solving it by different animal groups;8. Urine formation in human kidney;9. Bioluminescence: occurrence, mechanism of production		Dr. Anindya Sundar Bhunia	
Module 702: Endocrinology and Reproductive biology	<ol> <li>Classification of vertebrate hormones based on chemical nature and mechanism of action (names and examples only).;2.</li> <li>Hormone delivery systems: Endocrine, neuroendocrine, paracrine, neurocrine, autocrine (Definitions and examples only);</li> <li>Feedback control of hormone secretion: negative and positive. 4. Hormone biosynthesis (including sites of synthesis, outlines only): Thyroid hormones (T3, T4), testosterone, estrogen, progesterone, adreno-cortical hormones, Insulin, Adrenal catecholamines. 5. Physiologic functions of hormones: Insulin, glucagon. T3 and T4.;6.</li> <li>Hormonal control of spermatogenesis;7.</li> <li>Hormonal control of mammalian ovarian cycle, differences between estrous and menstrual cycle. 8. Mechanism of hormone actions (outlines only): cytoplasmic receptor, nuclear receptor, membrane Receptor, HRE, HSP, CAMP, cGMP, IP3-DAG, tyrosine kinase, calcium-calmodulin 9.</li> <li>Endocrine disorders (symptoms and causes</li> </ol>		Smt. Jayashree Shit	

	-		
	only): Diabetes insipidus; IDDM & NIDDM. Hypothyroidism and hyperthyroidism,		
	Conn's and Cusning's syndrome.		
Module 703:	1.Basic tissue types: epithelial, connective,	Dr. Amrita	
Histology	cardiac and nervous tissue(typical structure	Banerjee	
	of neuron and types of neuron, glial cells		
	etc);2.Membrane specializations of		
	epithelia. (Intercellular surface [cell		
	surfaces ) : 3 Exocrine glands: Types and		
	discharge of secretory products (merocrine.		
	apocrine, holocrine).;4.Principles of tissue		
	fixation, staining,;5.Histology of: stomach,		
	pancreas, testis, ovary, thyroid, lymph node.		
	(Outline of structures). 6. Histological		
	structure of mammalian nephron and		
	Paper VIII: Theory		
Module 801:	1.Outlines of historical concepts and	Dr. Amrita	
Developmental	experiments in the emergence of	Banerjee	
Biology	Spemann and Mangold's organizer		
	transplant experiments, von Baer's laws.: 2.		
	Germ layers and its contributions to the		
	development of different tissues in		
	vertebrates;. 3.Origin of germ cells,		
	Structural features of sperms and eggs in		
	sea urchins and in mammals, Gametogenesis		
	fertilization in sea urchins, internal		
	fertilization in mammals (in depth molecular		
	Details not required); 5.Cleavage Types of		
	cleavage found in animals and animal		
	groups that exhibit a type, outlines of		
	cleavage process in C. elegans, Zebrafish		
	generalized natterns, brief outlines of the		
	process in C. elegans, Zebra fish, Xenopus		
	and chick; 7.Organogenesis: development of		
	brain in chicken; 8. Conceptual outlines		
	(very brief) of – Cell potency and Stem Cells,		
	Sex determination in Drosophila and Man,		
	HOX genes in development		
Module 802:	1. Environmental pollutions (nature and	Smt.	
Environmental	sources of pollutants. Impacts on	Rituparna	
Pollutions and	ecosystems and humans, remedies): water,	Maity	
Toxicology	soil, air and sound		
	pollutions;2.Environmental laws: major ones		
	applicable in west Bengal;3. I OXICOlogy:		
	Science: 4. Dose-response relationships 5 In		
	vivo and In vitro toxicity test;6.Introduction		
	to the concepts of detoxication mechanisms		

Module 805	1 Mosquito-borne diseases: Malaria and	Dr. Indraiit	
Medical Zoology	Filaria- causative agents, their life cycle.	Biswas	
Wiedledi 20010gy	modes of infections in man. major modes of		
	treatments, major vector species in India,		
	their ecology and life cycles, control		
	measures; 2. Mosquito-borne diseases:		
	Dengue and DHF, Chikungunya- causative		
	virus, symptoms and treatments;3. Visceral		
	Leishmaniasis (Kala-azar)- causative species		
	and vectors in West Bengal; 4. Common		
	ticks and mites in human surroundings and		
	diseases caused by them		
Module 806:	1. Fishes and fishery: diversity of indigenous	Dr. Indrajit	
Economic	freshwater, estuarine, marine fishes and	Biswas Creat Jawa ahara a	
Zoology	shell fishes in West Bengal. Invasive and	Smt Jayashree	
	exotic species of fishes in West Bengal.	Smt Rituparna	
	Techniques of modern pisciculture and	Maity	
	prawn culture. Problems related to wild		
	prawn seed collections in Sunderbans, fish		
	productivities in India and West Bengal,		
	ecology and degradation of freshwater fish		
	(von briefidea): 2. Sericulture: cilks and cilk		
	worms sericulture practices, methods		
	scopes and problems: 3 Aniculture: Honey		
	bees and their behaviours in relation to bee-		
	keeping, popular methods of bee keeping.		
	scopes and problems; 4. Lac culture: Lac and		
	lac insects, host plants and lac cultivation,		
	scopes and problems; 5. Poultry birds:		
	different breeds, their advantages and		
	disadvantages, importance of indigenous		
	breeds 6. Cattle, goats and lambs: different		
	breeds, their advantages and disadvantages,		
	importance of Indigenous breeds		
	Paper IX: Practical	Dr. Anindya Sundar Bhunia	
	Group A	& Dr. Indrajit	
		Biswas	
	Group B	Smt. Jayashree	
		Dr. Amrita	
		Banerjee	
BSc. General	Paper-IV A		
Part-III			
	Aquaculture Principles, definition and scope	Dr. Indrajit	
	Fisheries resources of India (inland and off-	Biswas	
	shore). Exotic fishes their merits and		
	demerits. Induced breeding and its		
	importance. Basic principles of different		
	aquaculture system (Polyculture and		
	Integrated farming). Marine pearl culture,		
	culture of prawn and shrimps; Sericulture		
	Characteristics of sericulture industry and its		
	scope; kinds of silk worm, host plants. Life		
	history and rearing of Bombyx mori,		

harvesting and processing of cocoon, reeling and extraction of silk, pest on mulberry plants and diseases of Bombyx mori and control measures.Problems and prospects.; Apiculture Types of honey bees, modern methods of apiary management, products and its uses Pest and Pest Management – Pest – definition, types, life history and control i) Scirpophaga, ii) Sitophilus and iii) Bandicoota, Concept on IPM.; Poultry and Poultry Management – Duck and fowl – Types of breeds, rearing and disease management. Wild life and Biodiversity- 1. Conservation of Wild life- Importance and strategies, Concept of Biosphere Reserve, National Park and Wild life Sanctuary. 2. Basic concept of Biodiversity, Biodiversity hotspot.3. Endangered Indian mammals, Animal Cruelty Prevention Act. Biotechnology and Immunology –1.Basic concept of genetic engineering and cloning; 2.Concept of immunity; 3.Outline structure and classification of immunoglobulin; antigen-antibody reaction; 4. Basic principle		
antigen-antibody reaction; 4. Basic principle of vaccination.		
Paper-IV B- Practical	Dr. Indrajit Biswas, Dr. Anindya Sundar Bhunia & Smt. Jayashree Shit	

#### ACADEMIC CALENDAR

### DEPARTMENT OF ZOOLOGY

## June2020/ July 2020 - December/ January 2021

## 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> Semester

Semest er/ Year	Syllabus Module/ Unit	No. of Lecture	Teacher Name	Distributi on Tentative
SEM-I HONOURS	Non-Chordates I Paper Code: ZOOACOR01T	30		
	Unit 1: Protista, Parazoa and Metazoa General characteristics and Classification up to classes, Study of Paramoecium Life cycle and pathogenicity of Entamoeba histolytica and Plasmodium vivax	6	Dr. Indrajit Biswas	January'21- February'21
	<b>Unit 2: Porifera</b> General characteristics and Classification up to classes Canal system and spicules in sponges	5	Dr. Indrajit Biswas	February'- March'(1 <sup>st</sup> Week)
	<b>Unit 3: Cnidaria</b> General characteristics and Classification up to classes Polymorphism in CnidariaCorals and coral reefs: types, formation, distribution, conservation significance	6	Santanu Das	January- February'
	Unit 4: Ctenophora General characteristics	2	Santanu Das	February
	Unit 5: Platyhelminthes General characteristics and Classification up to classes, Life cycle and pathogenicity of <i>Fasciola hepatica</i> and <i>Taenia solium</i>	6	Dr. Anindya Sundar Bhunia	January- February'21
	Unit 6: Nemathelminthes General characteristics and Classification up to classes, Life cycle, and pathogenicity of Ascaris lumbricoides, Parasitic adaptations in helminths	5	Dr. Anindya Sundar Bhunia	- March'21(1 <sup>st</sup> Week)
	Non-Chordates I Lab Paper Code: ZOOACOR01P	30	Dr. Indrajit Biswas Santanu Das	January'21- March'21(1 <sup>st</sup> Week)
	ECOLOGY PAPER CODE: ZOOACOR02T	30		
	Unit 1: Introduction to Ecology History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere.	6	Rituparna Maity	January'21- February'21

Unit 2: Population life tables, survivorship curves, exponential and logistic growth, r and K strategies Population regulation - density dependent and independent factors	10	Rituparna Maity	February'- March'(1 <sup>st</sup> Week)
Unit 3: Community Community characteristics: species diversity, abundance, dominance, richness, Ecotone, Ecological succession and example of it.	5	Dr. S Rehan Ahmed	January'- Febrrary'
Unit 4: Ecosystyem Food chain: Detritus and grazing food chains,Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies	6	Dr. S Rehan Ahmed	February'- March'(1st Week)

	Unit 5: Applied Ecology Wildlife Conservation (in-situ and ex-situ conservation). Wild life protection act (1972)	3	Santanu Das	February'- March'1st Week)
	ECOLOGY LAB PAPER CODE: ZOOACOR02P	30	Rituparna Maity	January'21- March'21(1st Week)
SEM-I GENERAL	ANIMAL DIVERSITY PAPER CODE: ZOOGCOR01T	30		
	<b>Unit-1 Kingdom Protista</b> General characters and classification of Subkingdom Protozoa up to Phylum (Levine et al., 1980)	2	Dr. Indrajit Biswas	January'21-
	<b>Unit-2 Phylum Porifera</b> General character and classification up to classes; Canal System in Sycon	2	Dr. Indrajit Biswas	January- February'
	Unit-3 Phylum Cnidaria General characters and classification up to classes	1	Dr. Indrajit Biswas	WITHIN Febraary'21
	Unit-4 Phylum Platyhelminthes General characters and classification up to classes; Life history of Taenia solium	3	Dr. Indrajit Biswas	- March(1st Week)
	<b>Unit-5 Phylum Nematoda</b> General characters and classification up to classes; Life history of Ascaris lumbricoides	3	Dr. Anindya Sundar Bhunia	WITHIN January'21
	<b>Unit-6 Phylum Annelida</b> General characters and classification up to classes	1	Dr. Anindya Sundar Bhunia	WITHIN January'
	Unit-6 Phylum Annelida General characters and classification up to classes;	1	Dr. Anindya	-WITHIN Febraary'21

		Sundar Bhunia	
<b>Unit 7 Phylum Arthropoda</b> General characters and classification up to classes Metamorphosis in Insects	2	Dr. Anindya Sundar Bhunia	February'21- Febraary'21
<b>Unit-8 Phylum Mollusca</b> General characters and classification up to classes; Respiration in Pila	2	Dr. Anindya Sundar Bhunia	February'21- March'21(1st Week
<b>Unit-9 Phylum Echinodermata</b> General characters and classification up to classes; Water vascular system in Asterias	2	Rituparna Maity	February'21- March'21(1st Week)
Unit-10 Protochordates General features	1	Rituparna Maity	January'21- January'21
Unit-11 Agnatha General features and classification up to classes (Young, 1981)	1	Rituparna Maity	January'21- February'21
<b>Unit-12 Pisces</b> General features and Classification up to Subclasses (Romer, 1959); Osmoregulation in Fishes	2	Rituparna Maity	February'21- Febraary'21
<b>Unit-13 Amphibia</b> General features and Classification up to living orders (Duellman & Trueb, 1986); Metamorphosis in Toad	2	Santanu Das	January'21- February'21
<b>Unit-14 Reptiles</b> General features and Classification up to living Subclass (Young, 1981); Poisonous and non- poisonous snakes	2	Santanu Das	February'21- Febraary'21
Unit-15 Aves General features and Classification up to orders (Young, 1981); Flight adaptations in birds	2	Dr. S Rehan Ahmed	January'21- February'21
Unit-16 Mammals Classification up to Subclasses (Young, 1981)	1	Dr. S Rehan Ahmed	February'21- Febraary'21

	ANIMAL DIVERSITY PAPER CODE: ZOOGCOR01P	30	Rituparna Maity Dr. Anindya Sundar Bhunia	January'21- March'21(1st Week)
SEM-III	CHORDATES	60		

HONOURS	PAPER CODE: ZOOACOR05T			
	<b>Unit 1: Introduction to Chordates</b> General characteristics and outline classification of Phylum Chordata	4	Rituparna Maity	June'20-June'20
	Unit 2: Protochordata General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Metamorphosis in Ascidia Chordate Features and Feeding in Branchiostoma	8	Rituparna Maity	June'20-July'20
	Unit 3: Origin of Chordata Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata	5	Rituparna Maity	July'20-July'20
	<b>Unit 4: Agnatha</b> General characteristics and classification of cyclostomes up to order	2	Rituparna Maity	August'20
	Unit 5: Pisces 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	10	Rituparna Maity	August'20- October'21
	<b>Unit 6: Amphibia</b> General characteristics and classification up to living Orders Metamorphosis with parental care	5	Dr. S Rehan Ahmed	June'20-June'20
	<b>Unit 7: Reptilia</b> General characteristics and classification up to living Orders Poison apparatus and Biting mechanism in Snake	7	Dr. S Rehan Ahmed	June'20-July'20
	<b>Unit 8: Aves</b> General characteristics and classification up to Sub-Classes, Exoskeleton and migration in Birds, Principles and aerodynamics of flight	7	Dr. S Rehan Ahmed	July'20-August'20
	Unit 9: Mammals General characters and classification up to living orders, Phylogenetic significance of Prototheria Exoskeleton derivatives of mammals Adaptive radiation in mammals with reference to locomotory appendages Echolocation in Microchiropteransand Cetaceans	10	Dr. S Rehan Ahmed	August'20- September'20-
	Unit 10: Zoogeography Zoogeographical realms, Plate tectonic and Continental drift theory, Distribution of birds and mammals in different realms	2	Dr. S Rehan Ahmed	September'20

CHORDATES LAB PAPER CODE: ZOOACOR05P	60	Santanu Das Rituparn a Maity	Acc. To Revised Syllabus 90% completed by end of November
PHYSIOLOGY PAPER CODE: ZOOACOR06T	60		

<b>Unit 1: Tissues</b> Structure, locations, classification and functions of epithelial tissues, connective tissues, muscular tissues and nerve tissues	10	Dr. Indrajit Biswas	June'20-July20
Unit 2: Bone and Cartilage Structure and types of bones and cartilages,Ossification	5	Dr. Indrajit Biswas	July'20-August'20
Unit 3: 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, Reflex action and its types	15	Dr. Indrajit Biswas	August'20- November'20
Unit 4: Muscular system Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction, Characteristics of muscle fiber	10	Santanu Das	June'20-July'20
Unit 5: Reproductive System Histology of testis and ovary; Physiology of Reproduction	5	Santanu Das	August'20- september'20
Unit 6: Endocrine System 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	15	Dr. S Rehan Ahmed	September'20- December'2 0(1 <sup>st</sup> Week)
PHYSIOLOGY LAB PAPER CODE: ZOOACOR06T	60	Dr. Anindya Sundar Bhunia Dr. S Rehan Ahmed	Acc. To Revised Syllabus 90% completed by end of November
BIOCHEMISTRY PAPER CODE: ZOOACOR07T	60		

Unit 1: Fundamentals of biochemical reactions and metabolism 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	10	Dr. S Rehan Ahmed	June'20-July'20
Unit 2: Carbohydrates Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosachharides, Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis	10	Dr. S Rehan Ahmed	July'20- September'20
Unit 3: Lipids Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Triacylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpinoids. Lipid metabolism: β-oxidation of fatty acids; Fatty acid biosynthesis	4	Dr. S Rehan Ahmed	October'20- November'20

Unit 4: Proteins Amino acids Structure, Classification, General and Electro chemical properties of α-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	14	Dr. Anindya Sundar Bhunia	June'20- August'20
Unit 5: Nucleic Acids Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids Types of DNA and RNA, Complementarity of DNA, Hypo- Hyperchromaticity of DNA Outlines of nucleotide metabolism	4	Dr. Indrajit Biswas	June'20-July'20
Unit 6: Enzymes 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)	12	Dr. Anindya Sundar Bhunia	September'20- October'20

	Unit 7: Oxidative Phosphorylation Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System	6	Dr. Anindya Sundar Bhunia	November'20- December'2 0(1 <sup>st</sup> week)
	BIOCHEMISTRY LAB PAPER CODE: ZOOACOR07T	60	Dr. Anindya Sundar Bhunia Dr. S Rehan Ahmed	Acc. To Revised Syllabus 90% completed by end of November
SEM-III GENERAL	INSECT VECTOR AND DISEASES PAPER CODE: ZOOGCOR03T	60		
	<b>Unit-1 Introduction to Insect</b> s General Features of Insects, Morphological features, Head – Eyes, Types of antennae Mouth parts with respect to feeding habit	4	Dr. Indrajit Biswas	June'20-July20
	Unit-2 Concept of Vectors Brief introduction to Vectors (mechanical and biological), Reservoirs, Host-vector relationship, Adaptations as vectors, Host specificity	6	Dr. Anindya Sundar Bhunia	June-July'20
	Unit-3 Insects as Vectors Detailed features of insect orders as vectors – Diptera, Siphonoptera, Siphunculata, Hemiptera	6	Dr. S Rehan Ahmed	June'20-July'20
	Unit-4 Dipteran as Disease Vector Study of important Dipteran vectors – Mosquitoes, Sand fly, Houseflies vectors Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis Control of mosquitoes	16	Rituparna Maity	Sepetember'20- December'2 0(1 <sup>st</sup> Week)
	Unit-5 Siphonaptera as Disease Vectors Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas	10	Rituparna Maity	June'20- August'20
	Unit-6 Siphunculata as Disease Vectors Human louse (Head, Body and Pubic louse) as important insect vectors; Control of human louse	8	Santanu Das	June'20- August'20

Unit-7 Hempitera as Disease Vectors Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures	10	Santanu Das	September'20- November'20
INSECT VECTORE AND DISEASES PAPER CODE: ZOOGCOR03P	60	Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by end of

				November
SEM-V HONOURS	MOLECULAR BIOLOGY PAPER CODE: ZOOACOR11T	60		
	<b>Unit 1: Nucleic Acids</b> Salient features of DNA and RNA Watson and Crick Model of DNA	2	Dr. Anindya Sundar Bhunia	June'20-June'20
	Unit 2: DNA Replication Mechanism of DNA Replication in Prokaryotes, Semi conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres	6	Dr. Anindya Sundar Bhunia	June'20-July'20
	Unit 3: Transcription Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.	8	Dr. Anindya Sundar Bhunia	August'20- September'20
	<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	14	Dr. Indrajit Biswas	June'20- August'20
	Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA 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	10	Dr. Indrajit Biswas Dr. Anindya Sundar Bhunia	August'20- September'20
	Unit 6: Gene Regulation Regulation of Transcription in prokaryotes: lac operon and trp operon; Regulation of Transcription in eukaryotes	5	Dr. Indrajit Biswas	Septembar'20- Octobar'20
	Unit 7: DNA Repair Mechanisms Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair	9	Rituparna Maity	June'20- August'20
	Unit 8: Molecular Lab Techniques PCR, Western and Southern blot, Northern Blot,Sanger DNA sequencing, cDNA technology	5	Rituparna Maity	August'20- September'20
	MOLECULAR BIOLOGY LAB PAPER CODE: ZOOACOR11P	60	Dr. Anindya Sundar Bhunia	Acc. To Revised Syllabus 90% completed by

		Dr. Indrajit Biswas	end of November
GENETICS PAPER CODE: ZOOACOR12T	60		
Unit 1: Mendelian Genetics and its Extension Background of Mendel's experiments Principles of Mendelian inheritance,	12	Santanu Das	June'20-July'20

Incomplete dominance and co-dominance, Epistasis, Multiple alleles, Lethal alleles, Pleiotropy, Sex-linked, sex influenced and sex-limited inheritance, Polygenic Inheritance			
Unit 3: Mutations 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	12	Santanu Das	August'20- Sepetember'20
Unit 4: Sex Determination Mechanisms of sex determination in Drosophila with reference to alternative splicing Sex determination in mammals, Dosage compensation in Drosophila & Human	12	Dr. Indrajit Biswas	October"20
Unit 5: Extra-chromosomal Inheritance Criteria for extra chromosomal inheritance, Antibiotic resistance in Chlamyadomonas, Kappa particle in Paramoecium Shell spiralling in snail	8	Dr. S Rehan Ahmed	June'20-July'20
<b>Unit 6: Recombination in Bacteria and Viruses</b> Conjugation, Transformation, Transduction, Complementation test in Bacteriophage	8	Dr. S Rehan Ahmed	July'20-August'20
Unit 7: Transposable Genetic Elements Transposons in bacteria, Ac-Ds elements in maize and P elements in Drosophila, LINE, SINE, Alu elements in humans	8	Dr. S Rehan Ahmed	August'20- September'20
GENETICS LAB PAPER CODE: ZOOACOR12P	60	Dr. S Rehan Ahmed	Acc. To Revised Syllabus 90% completed by end of

			November
ENTOMOLOGY PAPER CODE: ZOOADSEO2T	60		
Unit 1: Introduction General Features of Insects Distribution and Success of Insects on the Earth	2	Dr. Indrajit Biswas	June'20
Unit 2: Insect Diversity and Classifications 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)	4	Dr. Indrajit Biswas	June'20-July'20
Unit 3: General Morphology of Insects (brief outlines) External Features; Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits Thorax: Wings and wing types, Types of Legs adapted to diverse habitats, Peculiar Abdominal appendages and genitalia- only brief introduction.	12	Dr. Indrajit Biswas	July'20-August'20
Unit 4: Physiology of Insects Structure and physiology of Insect body systems - Integumentary, digestive, excretory, circulatory,	16	Dr. Indrajit Biswas	September'20- October'20

	respiratory, endocrine, reproductive, and nervous system (brief outlines only) Photoreceptors: Types, Structure and Function (brief introductions) Metamorphosis: Types and Neuroendocrine control of metamorphosis (introductory)			
	Unit 5: Insect Society Social insects: different types of social insects with brief outlines of their social systems Trophallaxis in social insects such as ants, termites and bees	8	Dr. Indrajit Biswas	October'20- November'20
	Unit 6: Insect Plant Interaction Outline of the concept of co-evolution, role of allo chemicals in host plant mediation, Host-plant selection by phytophagous insects; Major insect pests in paddy (brief introductions)	14	Dr. Indrajit Biswas	November'20
-	Unit 7: Insects as Vectors Insects as mechanical and biological vectors, Brief discussion on houseflies and mosquitoes as important vectors	4	Dr. Indrajit Biswas	End In 1 <sup>st</sup> Week of December'20

	BIOLOGY OF INSECTS LAB PAPER CODE: ZOOADSE02P	60	Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by end of November
	ENDOCRINOLOGY PAPER CODE: ZOOADSE03T	60		
	Unit 1: Introduction to Endocrinology General idea of Endocrine systems, Classification, Characteristic and Transport of Hormones Neurosecretions and Neurohormones	12	Rituparna Maity	September'20- november'20
	Unit 2: Epiphysis, Hypothalamo-hypophysial Axis Structure of pineal gland, Secretions and their functions in biological rhythms and reproduction; Structure and functions of hypothalamus and Hypothalamic nuclei, Regulation of neuroendocrine glands, Feedback mechanisms; Structure of pituitary gland, Hormones and their functions, Hypothalamo-hypophysial portal system, Disorders of pituitary gland.	18	Santanu Das	September'20- November'20
	Unit 3: Peripheral Endocrine Glands Structure, Hormones, Functions and Regulation of Thyroid gland, , Parathyroid, Adrenal, Pancreas, Ovary and Testis; Hormones in homeostasis,Disorders of endocrine glands	16	Dr. Anindya Sundar Bhunia	September'20- 1stWeek of december'20
	Unit 4: Regulation of Hormone Action Mechanism of action of steroidal, non-steroidal hormones with receptors Bioassays of hormones using ELISA and RIA; Estrous cycle in rat and menstrual cycle in human Multifaceted role of Vasopressin & Oxytocin; Hormonal regulation of parturition	14	Dr. S Rehan Ahmed	September'20- 1stWeek of december'20
	ENDOCRINOLOGY LAB PAPER CODE: ZOOADSE03P	60	Dr. Indrajit Biswas Dr. Anindya Sundar Bhunia	Acc. To Revised Syllabus 90% completed by end of November
SEM-V GENERAL	APPLIED ZOOLOGY PAPER CODE: ZOOGDSE01T	60		
	Unit-1 Introduction to Host-parasite Relationship Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis	2	Dr. Indrajit Biswas	June'20-June'20

Unit-2 Epidemiology of Diseases	4	Dr. Indrajit Biswas	June'20-july'20
		0130003	

diseases: Tuberculosis, Typh	oid			
Unit-3 Rickettsia and Spiroc Brief account of Rickettsia p recurrentis and Treponema	<b>hetes</b> rowazekii, Borrelia pallidum	6	Dr. S Rehan Ahmed	June'20-July'20
<b>Unit-4 Parasitic Protozoa</b> Life history and pathogenicit histolytica, Plasmodium vive gambiense	ry of Entamoeba ax and Trypanosoma	8	Dr. Anindya Sundar Bhunia	June'20- August'20
Unit-5 Parasitic Helminthes Life history and pathogenicit duodenale and Wuchereria	ry of Ancylostoma bancrofti	4	Dr. Anindya Sundar Bhunia	September'20- October'20
Unit-6 Insects of Economic I Biology, Control and damage armigera, Pyrilla perpusilla a Callosobruchus chinensis, Si Tribolium castaneum	<b>mportance</b> e caused by Helicoverpa nd Papilio demoleus, tophilus oryzae and	12	Dr. S Rehan Ahmed	August'20- November'20
<b>Unit-7 Insects of Medical Im</b> Medical importance and cor humanus corporis, Anophel Xenopsylla cheopis	p <b>ortance</b> htrol of Pediculus es, Culex, Aedes,	8	Dr. Indrajit Biswas	August'20- October'20
Unit-8 Animal Husbandry Preservation of semen and a	artificial insemination in cattle	6	Rituparna Maity	June'20-July'20
Unit-9 Poultry Farming Principles of poultry breedir stock and broilers, Processin Unit	g, Management of breeding g and preservation of eggs	6	Rituparna Maity	August'20- September'20
<b>Unit-10 Fish Technology</b> Genetic improvements in aq Induced breeding and trans	uaculture industry; portation of fish seed	4	Rituparna Maity	October'20- November'20
APPLIED ZO PAPER CODE:	OLOGY LAB ZOOGDSE01P	60	Santanu Das	Acc. To Revised Syllabus 90% completed by end of November

#### ACADEMIC CALENDAR

#### DEPARTMENT OF ZOOLOGY

# January/ February 2021 - June/July 2021

# 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> Semester

Semest er/ Year	Syllabus Module/ Unit	No. of Lecture	Teacher Name	Distributi on Tentative
SEM-II HONOURS	Non-Chordates II Paper Code: ZOOACOR03T	30		
	Unit 1: Introduction to Coelomates Evolution of coelom and metamerism	3	Dr. Indrajit Biswas	1st week May
	Unit 2: Annelida General characteristics and Classification up to classes Excretion in Annelida	4	Dr. Indrajit Biswas	2 <sup>nd</sup> week May
	Unit 3: Arthropoda General characteristics and Classification up to classes,Metamorphosis in Insects Social life in bees and termites	8	Dr. Indrajit Biswas	3rd Week of May 3 <sup>rd</sup> week of June
	Unit 4: Onychophora General characteristics	2		
	Unit 5: Mollusca General characteristics and Classification up to classes Respiration in Mollusca Torsion and detorsion in Gastropoda	6	Santanu Das	1 <sup>st</sup> week of May 3rd week of May
	Unit 6: Echinodermata General characteristics and Classification up to classes Water-vascular system in Asteroidea Larval forms in Echinodermata	4	Mr. Santanu Das	4 <sup>th</sup> week of May – 1 <sup>st</sup> week of June
	Unit 7: Hemichordata General characteristics of phylum Hemichordata. Phylogenetic relationship with non-chordates and chordates (only recent concept)	3	Smt. Rituparna maity	1 <sup>st</sup> week of May 4 <sup>th</sup> week of May
	Non-Chordates II Lab Paper Code: ZOOACOR03P	30	Dr. Indrajit Biswas Smt. Rituparna Maity	Acc. To Revised Syllabus 90% completed by end of July
	CELL BIOLOGY PAPER CODE: ZOOACOR04T	30		
	Unit 1: Overview of Cells Prokaryotic and Eukaryotic cells, Virus, Viroids	2	Dr. S Rehan Ahmad	1 <sup>st</sup> week of May

	Unit 2: Plasma Membrane Various models of plasma membrane structure Transport across membranes: Active and Passive transport, facilitated transport, Cell junctions: Tight junctions, Desmosomes, Gap junctions	5	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of May 1 <sup>st</sup> week of June
	Unit 3: Endomembrane System Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes	4	Dr. S Rehan Ahmad	2 <sup>nd</sup> week June-end of June
	Unit 4: Mitochondria and Peroxisomes Mitochondria: Structure, Semi-autonomous nature, Mitochondrial Respiratory Chain, Peroxisomes	4	Mr.Santa nu Das	2 <sup>nd</sup> week of June 3 <sup>rd</sup> week of June

	Unit 5: Cytoskeleton Structure and Functions: Microtubules, Microfilaments and Intermediate filaments	2	Mr. Santanu Das	1st week of July
	Unit 6: Nucleus Structure of Nucleus: Nuclear envelope, Nucleolus Chromatin: Euchromatin and Heterochromatin and packaging (nucleosome)	4	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May - end of may
	Unit 7: Cell Division Mitosis and Meiosis Cell cycle and its regulation Mechanisms of cell death: brief overview	5	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of June End of june
	Unit 8: Cell Signaling Cell signalling transduction pathways; Types of signaling molecules and receptors GPCR and Role of second messenger (cAMP)	4	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of July End of july
	CELL BIOLOGY LAB PAPER CODE: ZOOACOR04P	30	Dr. Anindya Sundar Bhunia Dr. S Rehan Ahmad	Acc. To Revised Syllabus 90% completed by end of July
SEM-II GENERAL	PHYSIOLOGY AND BIOCHEMISTRY PAPER CODE: ZOOGCOR02T	30		
	Unit-1 Nerve and muscle 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.	4	Dr. Indrajit Biswas	1 <sup>st</sup> week of May End of May

Unit-2 Digestion Absorption of carbohydrates, proteins, lipids	2	Dr. Indrajit Biswas	1st week of july
Unit-3 Respiration Pulmonary ventilation, Respiratory volumes and capacities, Transport of Oxygen and carbon dioxide in blood	3	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May End of May
Unit-4 Excretion Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism	3	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of July End of July
Unit-5 Cardiovascular system Composition of blood, Homeostasis, Structure of Heart, Origin and conduction of the cardiac impulse, Cardiac cycle	3	Smt. Rituparna maity	1 <sup>st</sup> week of May End of May
Unit-6 Reproduction and Endocrine Glands Physiology of male reproduction: hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle. Structure and function of thyroid, pancreas	4	Smt. Rituparna maity	1 <sup>st</sup> week of June 1 <sup>st</sup> week of July
Unit 7 Carbohydrate: Structure and Metabolism Introduction to Carbohydrates, Structure & Types of Carbohydrates, Introduction to Intermediary metabolism: Glycolysis, Krebs cycle, Electron transport chain	4	Dr. S Rehan Ahmad	1 <sup>st</sup> week of May End of May
Unit-8 Lipid: Structure and Metabolism Introduction to Lipids: Definitions; classes of lipids; $\beta$ oxidation of palmitic acid	2	Dr. S Rehan Ahmad	1 <sup>st</sup> week of July
Unit-9 Protein: Structure and metabolism	2	Mr. Santanu Das	1 <sup>st</sup> week of May

Proteins and their biological functions, functions of amino acids; primary structure of protein, secondary, tertiary and quaternary structures. Transamination, Deamination.			
Unit-10 Enzymes 4 Introduction, Classification of Enzymes, Mechanism of action,Enzyme Kinetics, Inhibition and Regulation	2	Mr. Santanu Das	3 <sup>rd</sup> week of May
PHYSIOLOGY AND BIOCHEMISTRY LAB PAPER CODE: ZOOGCOR02P	30	Smt. Rituparna Maity Dr. Anindya Sundar	Acc. To Revised Syllabus 90% completed by end of July

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SEM-IV HONOURS	COMPARATIVE ANATOMY PAPER CODE: ZOOACOR08T	30		
	Unit 1: Integumentary System- Structure, function and derivatives of integument in mammals	5	Santanu Das	1 <sup>st</sup> week of May End of May
	Unit 2: Skeletal System, Jaw Suspension	2	Santanu Das	1 <sup>st</sup> week of june
	Unit 3: Digestive System- Comparative anatomy of stomach; dentition in mammals	4	Smt. Rituparna maity	1 <sup>st</sup> week of May 3 <sup>rd</sup> week of May
	Unit 4: Respiratory System- Respiratory organs in birds	4	Smt. Rituparna maity	4 <sup>th</sup> week of May 2 <sup>nd</sup> week of June
	Unit 5: Circulatory System- Comparative account of heart and aortic arches	4	Dr. S Rehan Ahmad	1 <sup>st</sup> week of May 3 <sup>rd</sup> week of May
	Unit 6: Urinogenital System- Succession of kidney	3	Dr. S Rehan Ahmad	3 <sup>rd</sup> week of May 1 <sup>st</sup> week of June
	Unit 7: Nervous System Comparative account of brain, Cranial nerves in mammals	4	Dr. Indrajit Biswas	1 <sup>st</sup> week of May End of May
	Unit 8: Sense Organs Classification of receptors	4	Dr. Indrajit Biswas	1 <sup>st</sup> week of June 2 <sup>nd</sup> week of june
	COMPARATIVE ANATOMY LAB PAPER CODE: ZOOACOR08P	30	Mr. Santanu Das Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by end of July
	PHYSIOLOGY: LIFE SUSTANING SYSTEM PAPER CODE: ZOOACOR09T	30		
	Unit 1: Physiology of Digestion-Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids, Proteins, Digestive enzyme	4	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of June 3 <sup>rd</sup> week of June
	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,	6	Dr. S Rehan Ahmad	3 <sup>rd</sup> week of June 1 <sup>st</sup> week of July

Unit 3: Physiology of Circulation- Components of Blood and their functions; Structure and functions of haemoglobin; Blood clotting system, Blood groups; ABO and Rh factor	4	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May 3 <sup>rd</sup> week of May
Unit 4: Physiology of Heart- Structure of mammalian heart, Origin and conduction of cardiac impulses; Cardiac Cycle and cardiac output; Blood pressure and its regulation	6	Dr. Anindya Sundar Bhunia	4 <sup>th</sup> week of May 2 <sup>nd</sup> week of June

Unit 5: Thermoregulation & Osmoregulation Physiological classification based on thermal biology. Thermal biology of endotherms; Osmoregulation in aquatic vertebrates;	4	Smt. Rituparna maity	3 <sup>rd</sup> week of June 1 <sup>st</sup> week of July
Unit 6: Renal Physiology Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid-base balance	6	Smt. Rituparna maity	1 <sup>st</sup> week of July 4 <sup>th</sup> week of July
PHYSIOLOGY: LIFE SUSTAINING SYSTEM LAB PAPER CODE: ZOOACOR09T	30	Dr. Anindya Sundar Bhunia Smt. Rituparna maity	Acc. To Revised Syllabus 90% completed by end of July
IMMUNOLOGY PAPER CODE: ZOOACOR10T	30		
Unit 1: Overview of Immune System-Organs (Primary & Secondary lymphoid organs and its importance) and Cells of the Immune system	1	Dr. Indrajit Biswas	3 <sup>rd</sup> week of June
Unit 2: Innate and Adaptive Immunity Principle of Innate and Adaptive Immunity. • Components of innate immunity– 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 T- Cell Immunity [concept]) – Humoral mechanisms (Formation of Plasma B	5	Dr. Indrajit Biswas	3 <sup>rd</sup> week of June 2 <sup>nd</sup> week of July

cells and Memory B cells [concept]			
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), Co-stimulatory molecules on APC.	4	Dr. Anindya Sundar Bhunia	3 <sup>rd</sup> week of June End of June
Unit 3: T Cell development Structure of T cell receptors, Co-stimulatory molecules on T cells, Central differentiation of T cells; T cell selection in thymus Peripheral differentiation of T cells; Th1 & Th2	4	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of July 3 <sup>rd</sup> week of July
Unit 4: Immunoglobulins Structure and functions of different classes of immunoglobulins, Antigen antibody interactions, Immunoassays (ELISA and RIA), Hybridoma technology, Monoclonal antibody production	4	Mr.Santa nu Das	2 <sup>nd</sup> week of June 4 <sup>th</sup> week of June

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, GMCSF, M-CSF).	4	Mr. Santanu Das	End of June-2 <sup>nd</sup> week ofJuly
Unit 7: Complement System Components and pathways of complement activation	2	Smt. Rituparna maity	End of July
Unit 8: Hypersensitivity Gell and Coombs' classification and brief description of various types of hypersensitivities.	2	Smt. Rituparna maity	End of July
Unit 9: Immunology of diseases Malaria, Dengue	2	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of July
Unit 10: Vaccines Various types of vaccines. Active & passive immunization (Artificial and natural).	2	Dr. S Rehan Ahmad	End of July

	IMMUNOLOGY LAB PAPER CODE: ZOOACOR10T	30	Dr. Anindya Sundar Bhunia Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by end of July
SEM-IV GENERAL	ENVIRONMENT AND PUBLIC HEALTH PAPER CODE: ZOOGCOR04T	30		
	Unit 1: Introduction Sources of Environmental hazards, Hazard identification and accounting, Fate of toxic and persistent substances in the environment, Dose response evaluation, Exposure assessment	8	Dr. Indrajit Biswas	1 <sup>st</sup> week of May End of July
	Unit 2: Climate Change Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health	6	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week May-end of June
	Unit 3: Pollution Air, water pollution: sources and effects, Pollution control	8	Smt. Rituparna maity	1 <sup>st</sup> week of May End of July
	Unit 4: Waste Management Technologies Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal.	4	Dr. S Rehan Ahmad	1st week of May End of June
	Unit 5: Diseases Causes, symptoms and control of tuberculosis, Asthma, Cholera.	2	Mr Santanu Das	1 <sup>st</sup> week of May 4 <sup>th</sup> week of May
	ENVIRONMENT AND PUBLIC HEALTH PAPER CODE: ZOOGCOR04P	30	Dr. Indrajit Biswas Dr. S Rehan Ahmad	Acc. To Revised Syllabus 90% completed by end of July
SEM-VI HONOURS	DEVELOPMENTAL BIOLOGY PAPER CODE: ZOOACOR13T	30		
	Unit 1: Introduction Basic concepts: Phases of Development, Cell-cell interaction, Differentiation and growth	4	Smt. Rituparna maity	1 <sup>st</sup> week of May 3 <sup>rd</sup> week of May

Unit 2: Early Embryonic Development Gametogenesis, Spermatogenesis, Oogenesis; 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 chick up to gastrulation; Embryonic induction and organizers	8	Mr. Santanu Das	1 <sup>st</sup> week of May End of May
Unit 3: Late Embryonic Development Fate of Germ Layers; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta)	6	Dr. S Rehan Ahmad	1 <sup>st</sup> week of May 4 <sup>th</sup> week of May
Unit 4: Post Embryonic Development Development of brain and Eye in Vertebrate	6	Dr. S Rehan Ahmad	4 <sup>th</sup> week of May 2 <sup>nd</sup> week of June
Unit 5: Implications of Developmental Biology Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis	6	Smt. Rituparna maity	4 <sup>th</sup> week of May 1 <sup>st</sup> week of June
DEVELOPMENTAL BIOLOGY LAB PAPER CODE: ZOOACOR13P	30	Dr. S Rehan Ahmad Mr.Santa nu Das	Acc. To Revised Syllabus 90% completed by end of July
EVOLUTIONARY BIOLOGY PAPER CODE: ZOOACOR14T	30		
Unit 1: Origin of earliest life- Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes, three domains of life	2	Dr. Indrajit Biswas	1 <sup>st</sup> week of May
Unit 2: Historical review of evolutionary concept-Pre Darwinian Concepts and theories including Lamarckism, Darwininan Theory Neo-Darwinian Synthesis	4	Dr. Indrajit Biswas	2 <sup>nd</sup> week of May End of May
Unit 3: Evidences in favour of Evolution-Fossil records: types of fossils, geological time scale, transitional forms:	2	Dr. S Rehan Ahmad	3 <sup>rd</sup> week of June

Unit 5: Population genetics- Populations and calculation of alle in a population Hardy-Weinb equilibrium (derivations, applications of law to find gene and frequencies in human Populations) forces disrupting H-W equilibriumN selection: Definition as the non-dif of reproductions and survivals of com concept of fitness, selection coeffic natural selection with examples- Di Stabilizing, Directional. Genetic Drift mechanism, basic concepts and exa founder's effect, bottleneck pheno	Concept of ele frequencies erg Law and d genotype Evolutionary latural ferential rate peting alleles, ient, Types of srupting, ft- outline of its amples of menon;	8	Mr.Santa nu Das	1 <sup>st</sup> week of June End of june
Unit 6: Products of evolution Inter- variations: clines, races, Species co modes of speciation (just outlines Sympatric isolating mechanisms Ad radiations)	population ncepts and of Allopatric, daptive	5	Smt. Rituparna maity	2 <sup>nd</sup> week June-4 <sup>th</sup> week Of June

Unit 8: Origin and evolution of man-Unique hominin characteristics contrasted with primate characteristics (including social and cultural ones), Molecular evidences of human origin and migrations (brief outline)	6	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May 4 <sup>th</sup> week of May
Unit 9: Molecular Phylogeny-Neutral theory of molecular evolution, molecular clock (brief introductions) Example of evolution in vertebrate globin genes	4	Dr. Anindya Sundar Bhunia	End of May-1 <sup>st</sup> week of June
EVOLUTIONARY BIOLOGY LAB PAPER CODE: ZOOACOR14P	30	Dr. Indrajit Biswas Santanu Das	
FISH AND FISHERY PAPER CODE: ZOOADSEO4T	30		
Unit 1: Introduction and Classification-Feeding habit, habitat and manner of reproduction Classification of fish (up to Subclasses) with important examples	2	Dr. Indrajit Biswas	1 <sup>st</sup> week of July
Unit 2: Morphology and Physiology Types of fins,Types of Scales, Use of scales in Classification and determination of age of fish; Gills and gas exchange; Swim Bladder: Types and role in	8	Dr. S Rehan Ahmad	4 <sup>th</sup> week of June 2 <sup>nd</sup> week of july

Respiration, buoyancy, Bioluminescence			
Unit 3: Fisheries Inland Fisheries; Marine Fisheries; Environmental factors influencing the seasonal variations in fish catches in the Arabian Sea and the Bay of Bengal; Fishing crafts and Gears; Depletion of fishery resources; Application of remote sensing and GIS in fisheries;	8	Mr.Santa nu Das	1 <sup>st</sup> week of July 3 <sup>rd</sup> week of July
Unit 4: Aquaculture Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Pen and cage culture; Polyculture; Composite fish culture; Brood stock management; Induced breeding of fish, Fish diseases	10	Smt. Rituparna maity	End of June-3 <sup>rd</sup> week of July
Unit 5: Fish in research Transgenic fish	2	Dr. Anindya Sundar Bhunia	2 <sup>nd</sup> week of June
FISH AND FISHERYLAB PAPER CODE: ZOOADSE04P	30	Dr. S Rehan Ahmad Smt. Rituparna maity	Acc. To Revised Syllabus 90% completed by end of July
PARASITOLOGY PAPER CODE: ZOOADSE05T	30		
Unit 1: Introduction to Parasitology Brief introduction of Parasitism and other animal associations, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship and zoonosis	2	Smt. Rituparna maity	4 <sup>th</sup> week of July
Unit 2: Parasitic Protists Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Entamoeba histolytica, Giardia intestinalis, Leishmania donovani, Plasmodium vivax	10	Dr. Indrajit Biswas	2nd week of July End of July

Unit 3: Parasitic Platyhelminthes Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of <i>Fasciola hepatica, Schistosoma</i> <i>haematobium, Taenia solium</i>	8	Mr. Santanu Das	3 <sup>rd</sup> week of July end of July
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	Unit 4: Parasitic Arthropoda Mosquitoes, as vectors of human pathogen Biology, importance and control of myiasis causing diptera Biology, importance and control of ticks, mites, <i>Pediculus</i> <i>humanus</i> (head and body louse),	8	Dr. Anindya Sundar Bhunia	3rd week of June end of July
	PARASITOLOGY LAB PAPER CODE: ZOOADSE05P	30	Dr. S Rehan Ahmad Smt. Rituparna maity	Acc. To Revised Syllabus 90% completed by end of July
SEM-VI GENERAL	IMMUNOLOGY PAPER CODE: ZOOGDSE04T	30		
	Unit-1 Overview of the Immune System Introduction to basic concepts in immunology, components of immune system, principles of innate and adaptive immune system	4	Dr. S Rehan Ahmad	1 <sup>st</sup> week of May End of May
	Unit-2 Cells and Organs of the Immune System Cells of immune system and organs (primary and secondary lymphoid organs) of the immune system	4	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May End of May
	Unit-3 Antigens Basic properties of antigens, B and T cell epitopes, haptens and adjuvants	6	Dr. S Rehan Ahmad	End of May-end of June
	Unit-4 Antibodies Structure, classes and function of antibodies, antigen antibody interactions as tools for research and diagnosis	4	Smt. Rituparna maity	1 <sup>st</sup> week of May End of May
	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,	4	Santanu Das	1 <sup>st</sup> week of May End of May
	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	6	Dr. Indrajit Biswas	1 <sup>st</sup> week of May 2 <sup>nd</sup> week of June
	Ùnit-7 Vaccines General introduction to vaccines, Types of vaccines	2	Dr. Indrajit Biswas	3rd week of June
	IMMUNOLOGY LAB PAPER CODE: ZOOGDSE04P	30	Dr. Anindya Sundar Bhunia Mr. Santanu Das	Acc. To Revised Syllabus 90% completed by end of July

### ACADEMIC CALENDAR

### DEPARTMENT OF ZOOLOGY

# July'21/Sepetember'21- December'21/January'22

Semest er/ Year	Syllabus Module/ Unit	No. of Lecture	Teacher Name	Distribution Tentative
SEM-I HONOURS	Non-Chordates I Paper Code: ZOOACOR01T	30		
	Unit 1: Protista, Parazoa and Metazoa General characteristics and Classification up to classes, Study of Paramoecium Life cycle and pathogenicity of Entamoeba histolytica and Plasmodium vivax	6	Dr. Indrajit Biswas	Sepetember'21- November'21
	Unit 2: Porifera General characteristics and Classification up to classes Canal system and spicules in sponges	5	Dr. Indrajit Biswas	November'21-1st week of January'22
	Unit 3: Cnidaria General characteristics and Classification up to classes Polymorphism in CnidariaCorals and coral reefs: types, formation, distribution, conservation significance	6	Santanu Das	September'21- November'21
	Unit 4: Ctenophora General characteristics	2	Santanu Das	November'21- November'21
	Unit 5: Platyhelminthes General characteristics and Classification up to classes, Life cycle and pathogenicity of Fasciola hepatica and Taenia solium	6	Dr. Anindya Sundar Bhunia	September'21- November'21
	Unit 6: Nemathelminthes General characteristics and Classification up to classes, Life cycle, and pathogenicity of Ascaris lumbricoides, Parasitic adaptations in helminths	5	Dr. Anindya Sundar Bhunia	November'21-1st week of January'22
	Non-Chordates I Lab Paper Code: ZOOACOR01P	30	Dr. Indrajit Biswas Santanu Das	September'21- 1st week of January'22
	ECOLOGY PAPER CODE: ZOOACOR02T	30		

# 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> Semester

Unit 1: Introduction to Ecology History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere.	6	Rituparna Maity	September'21- November'21
Unit 2: Population life tables, survivorship curves, exponential and logistic growth, r and K strategies Population regulation - density- dependent and independent factors	10	Rituparna Maity	November'21-1st week of January'22
Unit 3: Community Community characteristics: species diversity, abundance, dominance, richness, Ecotone, Ecological succession and example of it.	5	Dr. S Rehan Ahmed	September'21- 1st week of January'22

	Unit 4: Ecosystyem Food chain: Detritus and grazing food chains,Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies	6	Dr. S Rehan Ahmed	November'21-1st week of January'22
	Unit 5: Applied Ecology Wildlife Conservation (in-situ and ex-situ conservation). Wild life protection act (1972)	3	Santanu Das	November'21-1st week of January'22
	ECOLOGY LAB PAPER CODE: ZOOACOR02P	30	Rituparna Maity	September'21- 1st week of January'22
SEM-I GENERAL	ANIMAL DIVERSITY PAPER CODE: ZOOGCOR01T	30		
	<b>Unit-1 Kingdom Protista</b> General characters and classification of Subkingdom Protozoa up to Phylum (Levine et al., 1980)	2	Dr. Indrajit Biswas	September'21- September'21
	Unit-2 Phylum Porifera General character and classification up to classes; Canal System in Sycon	2	Dr. Indrajit Biswas	September'21- November'21
	Unit-3 Phylum Cnidaria General characters and classification up to classes	1	Dr. Indrajit Biswas	November'21 1st week of January'22
	Unit-4 Phylum Platyhelminthes General characters and classification up to classes; Life history of Taenia solium	3	Dr. Indrajit Biswas	November'21-1st week of January'22

Unit-5 Phylum Nematoda General characters and classification up to classes; Life history of Ascaris lumbricoides	3	Dr. Anindya Sundar Bhunia	September'21- September'21
<b>Unit-6 Phylum Annelida</b> General characters and classification up to classes	1	Dr. Anindya Sundar Bhunia	September'21- September'21
<b>Unit-6 Phylum Annelida</b> General characters and classification up to classes;	1	Dr. Anindya Sundar Bhunia	November'21- 1st week of January'22
Unit 7 Phylum Arthropoda General characters and classification up to classes Metamorphosis in Insects	2	Dr. Anindya Sundar Bhunia	November'21- 1st week of January'22
Unit-8 Phylum Mollusca General characters and classification up to classes; Respiration in Pila	2	Dr. Anindya Sundar Bhunia	November'21-1st week of January'22
<b>Unit-9 Phylum Echinodermata</b> General characters and classification up to classes; Water-vascular system in Asterias	2	Rituparna Maity	November'21-1st week of January'21(1st Week)
Unit-10 Protochordates General features	1	Rituparna Maity	September'21- September'21
<b>Unit-11 Agnatha</b> General features and classification up to classes (Young, 1981)	1	Rituparna Maity	September'21- November'21
<b>Unit-12 Pisces</b> General features and Classification up to Subclasses (Romer, 1959); Osmoregulation in Fishes	2	Rituparna Maity	November'21- Febraary'21
<b>Unit-13 Amphibia</b> General features and Classification up to living orders (Duellman & Trueb, 1986); Metamorphosis in Toad	2	Santanu Das	September'21- November'21

Unit-14 Reptiles General features and Classification up to living Subclass (Young, 1981); Poisonous and non poisonous snakes	2	Santanu Das	November'21- 1st week of January'22
<b>Unit-15 Aves</b> General features and Classification up to orders (Young, 1981); Flight adaptations in	2	Dr. S Rehan Ahmed	September'21- November'21

	birds			
	<b>Unit-16 Mammals</b> Classification up to Subclasses (Young, 1981)	1	Dr. S Rehan Ahmed	November'21-
	ANIMAL DIVERSITY PAPER CODE: ZOOGCOR01P	30	Rituparna Maity Dr. Anindya Sundar Bhunia	September'21- 1st week of January'22
SEM-III HONOURS	CHORDATES PAPER CODE: ZOOACOR05T	60		
	Unit 1: Introduction to Chordates General characteristics and outline classification of Phylum Chordata	4	Rituparna Maity	September"21- September"21
	Unit 2: Protochordata General characteristics and classification of sub phylum Urochordata and Cephalochordata up to Classes. Metamorphosis in Ascidia Chordate Features and Feeding in Branchiostoma	8	Rituparna Maity	September"21- October"21
	Unit 3: Origin of Chordata Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata	5	Rituparna Maity	October"21- October"21
	<b>Unit 4: Agnatha</b> General characteristics and classification of cyclostomes up to order	2	Rituparna Maity	November"21
	Unit 5: Pisces 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	10	Rituparna Maity	November"21- October'21
	Unit 6: Amphibia General characteristics and classification up to living Orders Metamorphosis with parental care	5	Dr. S Rehan Ahmed	September"21- September"21
	Unit 7: Reptilia General characteristics and classification up to living Orders Poison apparatus and Biting mechanism in Snake	7	Dr. S Rehan Ahmed	September"21- October"21

Unit 8: Aves General characteristics and classification up to Sub Classes, Exoskeleton and migration in Birds, Principles and aerodynamics of flight	7	Dr. S Rehan Ahmed	October"21- November"21
Unit 9: Mammals General characters and classification up to living orders, Phylogenetic significance of Prototheria Exoskeleton derivatives of mammals	10	Dr. S Rehan Ahmed	September"21- November"21-

Adaptive radiation in mammals with reference to locomotory appendages Echolocation in Microchiropteransand Cetaceans			
Unit 10: Zoogeography Zoogeographical realms, Plate tectonic and Continental drift theory, Distribution of birds and mammals in different realms	2	Dr. S Rehan Ahmed	January'22 (1 <sup>st</sup> week)
CHORDATES LAB PAPER CODE: ZOOACOR05P	60	Santanu Das Rituparna Maity	Acc. To Revised Syllabus 90% completed by end of November
PHYSIOLOGY PAPER CODE: ZOOACOR06T	60		
Unit 1: Tissues Structure, locations, classification and functions of epithelial tissues, connective tissues, muscular tissues and nerve tissues	10	Dr. Indrajit Biswas	September"21- July20
Unit 2: Bone and Cartilage Structure and types of bones and cartilages,Ossification	5	Dr. Indrajit Biswas	October"21- November"21
Unit 3: 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,Reflex action and its types	15	Dr. Indrajit Biswas	November"21- November'21
Unit 4: Muscular system Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction, Characteristics of muscle fiber	10	Santanu Das	September"21- October"21

Unit 5: Reproductive System Histology of testis and ovary; Physiology of Reproduction	5	Santanu Das	November"21- september'21
Unit 6: Endocrine System 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	15	Dr. S Rehan Ahmed	September'21- December'21(1 <sup>st</sup> Week)
PHYSIOLOGY LAB PAPER CODE: ZOOACOR06T	60	Dr. Anindya Sundar Bhunia Dr. S Rehan Ahmed	Acc. To Revised Syllabus 90% completed by end of December
BIOCHEMISTRY PAPER CODE: ZOOACOR07T	60		
Unit 1: Fundamentals of biochemical reactions and metabolism Ionization of water, weak acids and bases, buffering and pH changes in living systems,	10	Dr. S Rehan Ahmed	September"21- October"21

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			
Unit 2: Carbohydrates Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosachharides, Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis	10	Dr. S Rehan Ahmed	October"21- September'21
Unit 3: Lipids Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Triacylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpinoids. Lipid metabolism: β-oxidation of fatty acids; Fatty acid biosynthesis	4	Dr. S Rehan Ahmed	October'21- November'21
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Unit 4: Proteins Amino acids Structure, Classification, General and Electro chemical properties of α-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	14	Dr. Anindya Sundar Bhunia	September"21- November"21
Unit 5: Nucleic Acids Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids Types of DNA and RNA, Complementarity of DNA, Hypo- Hyperchromaticity of DNA Outlines of nucleotide metabolism	4	Dr. Indrajit Biswas	September"21- October"21
Unit 6: Enzymes 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)	12	Dr. Anindya Sundar Bhunia	September'21- October'21
Unit 7: Oxidative Phosphorylation Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System	6	Dr. Anindya Sundar Bhunia	November'21- December'21(1 <sup>st</sup> week)

BIOCHEMISTRY LAB PAPER CODE: ZOOACOR07T	60	Dr. Anindya Sundar Bhunia Dr. S Rehan Ahmed	Acc. To Revised Syllabus 90% completed by end of December
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	SEC: SERICULTURE	15	Dr. Indrajit Biswas	4 weeks in December'21
	SEC LAB: SERICULTURE	15	Dr. Indrajit Biswas	
SEM-III GENERAL	INSECT VECTOR AND DISEASES PAPER CODE: ZOOGCOR03T	60		
	<b>Unit-1 Introduction to Insect</b> s General Features of Insects, Morphological features, Head – Eyes, Types of antennae Mouth parts with respect to feeding habit	4	Dr. Indrajit Biswas	September"21- October'21
	Unit-2 Concept of Vectors Brief introduction to Vectors (mechanical and biological), Reservoirs, Host-vector relationship, Adaptations as vectors, Host specificity	6	Dr. Anindya Sundar Bhunia	September'21- October"21
	Unit-3 Insects as Vectors Detailed features of insect orders as vectors – Diptera, Siphonoptera, Siphunculata, Hemiptera	6	Dr. S Rehan Ahmed	September"21- October"21
	Unit-4 Dipteran as Disease Vector Study of important Dipteran vectors – Mosquitoes, Sand fly, Houseflies vectors Study of mosquito borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis Control of mosquitoes	16	Rituparna Maity	Sepetember'21- December'21(1 <sup>st</sup> Week)
	Unit-5 Siphonaptera as Disease Vectors Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas	10	Rituparna Maity	September"21- November"21
	Unit-6 Siphunculata as Disease Vectors Human louse (Head, Body and Pubic louse) as important insect vectors; Control of human louse	8	Santanu Das	September"21- November"21
	Unit-7 Hempitera as Disease Vectors Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures	10	Santanu Das	September'21- November'21
	INSECT VECTORE AND DISEASES PAPER CODE: ZOOGCOR03P	60	Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by end of December
SEM-V HONOURS	MOLECULAR BIOLOGY PAPER CODE: ZOOACOR11T	60		

	Unit 1: Nucleic Acids Salient features of DNA and RNA Watson and Crick Model of DNA	2	Dr. Anindya Sundar Bhunia	September"21- September"21
	Unit 2: DNA Replication Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres	6	Dr. Anindya Sundar Bhunia	September"21- October"21
	Unit 3: Transcription Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.	8	Dr. Anindya Sundar Bhunia	September"21- November"21

Unit 4: Translation 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	14	Dr. Indrajit Biswas	September"21- November"21
Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA 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	10	Dr. Indrajit Biswas Dr. Anindya Sundar Bhunia	September"21- November"21
Unit 6: Gene Regulation Regulation of Transcription in prokaryotes: lac operon and trp operon; Regulation of Transcription in eukaryotes	5	Dr. Indrajit Biswas	Septembar'21- Octobar'21
Unit 7: DNA Repair Mechanisms Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair	9	Rituparna Maity	September"21- November"21
Unit 8: Molecular Lab Techniques PCR, Western and Southern blot, Northern Blot,Sanger DNA sequencing, cDNA technology	5	Rituparna Maity	November"21- September'21

MOLECULAR BIOLOGY LAB PAPER CODE: ZOOACOR11P	60	Dr. Anindya Sundar Bhunia Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by end of December
GENETICS PAPER CODE: ZOOACOR12T	60		
Unit 1: Mendelian Genetics and its Extension 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	12	Santanu Das	September"21- October"21
Unit 3: Mutations 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	12	Santanu Das	November"21- Sepetember'21

Unit 4: Sex Determination Mechanisms of sex determination in Drosophila with reference to alternative splicing Sex determination in mammals, Dosage compensation in Drosophila & Human	12	Dr. Indrajit Biswas	October"20
Unit 5: Extra-chromosomal Inheritance Criteria for extra chromosomal inheritance, Antibiotic resistance in Chlamyadomonas, Kappa particle in Paramoecium Shell spiralling in snail	8	Dr. S Rehan Ahmed	September"21- October"21
Unit 6: Recombination in Bacteria and Viruses Conjugation, Transformation, Transduction, Complementation test in Bacteriophage	8	Dr. S Rehan Ahmed	October"21- November"21
<b>Unit 7: Transposable Genetic Elements</b> Transposons in bacteria, Ac-Ds elements in maize and P elements in	8	Dr. S Rehan Ahmed	September"21- November"21

Drosophila, LINE, SINE, Alu elements in humans			
GENETICS LAB PAPER CODE: ZOOACOR12P	60	Dr. S Rehan Ahmed	Acc. To Revised Syllabus 90% completed by end of December
ENTOMOLOGY PAPER CODE: ZOOADSEO2T	60		
Unit 1: Introduction General Features of Insects-Distribution and Success of Insects on the Earth	2	Dr. Indrajit Biswas	September"21
Unit 2: Insect Diversity and Classifications 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)	4	Dr. Indrajit Biswas	September"21- October"21
Unit 3: General Morphology of Insects (brief outlines) External Features; Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits Thorax: Wings and wing types, Types of Legs adapted to diverse habitats, Peculiar Abdominal appendages and genitalia- only brief introduction.	12	Dr. Indrajit Biswas	October"21- November"21
Unit 4: Physiology of Insects 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)	16	Dr. Indrajit Biswas	September'21- October'21
Unit 5: Insect Society Social insects: different types of social insects with brief outlines of their social systems Trophallaxis in social insects such as ants, termites and bees	8	Dr. Indrajit Biswas	October'21- November'21
Unit 6: Insect Plant Interaction Outline of the concept of co-evolution, role of allo chemicals in host plant mediation, Host-plant selection by phytophagous insects; Major insect pests in paddy (brief introductions)	14	Dr. Indrajit Biswas	November'21

	Unit 7: Insects as Vectors Insects as mechanical and biological vectors, Brief discussion on houseflies and mosquitoes as important vectors	4	Dr. Indrajit Biswas	End In 1 <sup>st</sup> Week of January'22
	BIOLOGY OF INSECTS LAB PAPER CODE: ZOOADSE02P	60	Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by 1 <sup>st</sup> Week of January'22
	ENDOCRINOLOGY PAPER CODE: ZOOADSE03T	60		
	Unit 1: Introduction to Endocrinology General idea of Endocrine systems, Classification, Characteristic and Transport of Hormones Neurosecretions and Neurohormones	12	Rituparna Maity	September'21- november'21
	Unit 2: Epiphysis, Hypothalamo-hypophysial Axis Structure of pineal gland, Secretions and their functions in biological rhythms and reproduction; Structure and functions of hypothalamus and Hypothalamic nuclei, Regulation of neuroendocrine glands, Feedback mechanisms; Structure of pituitary gland, Hormones and their functions, Hypothalamo-hypophysial portal system, Disorders of pituitary gland.	18	Santanu Das	September'21- November'21
	Unit 3: Peripheral Endocrine Glands Structure, Hormones, Functions and Regulation of Thyroid gland, Parathyroid, Adrenal, Pancreas, Ovary and Testis; Hormones in homeostasis,Disorders of endocrine glands	16	Dr. Anindya Sundar Bhunia	September'21- 1stWeek of december'21
	Unit 4: Regulation of Hormone Action Mechanism of action of steroidal, non-steroidal hormones with receptors Bioassays of hormones using ELISA and RIA; Estrous cycle in rat and menstrual cycle in human Multifaceted role of Vasopressin & Oxytocin; Hormonal regulation of parturition	14	Dr. S Rehan Ahmed	September'21- 1stWeek of December'21
	ENDOCRINOLOGY LAB PAPER CODE: ZOOADSE03P	60	Dr. Indrajit Biswas Dr. Anindya Sundar Bhunia	Acc. To Revised Syllabus 90% completed by 1st week of January '22
SEM-V GENERAL	APPLIED ZOOLOGY PAPER CODE: ZOOGDSE01T	60		

Unit-1 Introduction to Host-parasite Relationship Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis	2	Dr. Indrajit Biswas	September"21- September"21
Unit-2 Epidemiology of Diseases Transmission, Prevention and control of diseases: Tuberculosis, Typhoid	4	Dr. Indrajit Biswas	September"21- October"21
Unit-3 Rickettsia and Spirochetes Brief account of Rickettsia prowazekii, Borrelia recurrentis and Treponema pallidum	6	Dr. S Rehan Ahmed	September"21- October"21
Unit-4 Parasitic Protozoa Life history and pathogenicity of Entamoeba histolytica, Plasmodium vivax and Trypanosoma gambiense	8	Dr. Anindya Sundar Bhunia	September"21- November"21

Unit-5 Parasitic Helminthes Life history and pathogenicity of Ancylostoma duodenale and Wuchereria bancrofti	4	Dr. Anindya Sundar Bhunia	September'21- October'21
Unit-6 Insects of Economic Importance Biology, Control and damage caused by Helicoverpa armigera, Pyrilla perpusilla and Papilio demoleus, Callosobruchus chinensis, Sitophilus oryzae and Tribolium castaneum	12	Dr. S Rehan Ahmed	November"21- November'21
Unit-7 Insects of Medical Importance Medical importance and control of Pediculus humanus corporis, Anopheles, Culex, Aedes, Xenopsylla cheopis	8	Dr. Indrajit Biswas	October'21- November'21
Unit-8 Animal Husbandry Preservation of semen and artificial insemination in cattle	6	Rituparna Maity	September"21- October"21
Unit-9 Poultry Farming Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs Unit	6	Rituparna Maity	September November"21-
<b>Unit-10 Fish Technology</b> Genetic improvements in aquaculture industry; Induced breeding and transportation of fish seed	4	Rituparna Maity	October'21- November'21
APPLIED ZOOLOGY LAB PAPER CODE: ZOOGDSE01P	60	Santanu Das	Acc. To Revised Syllabus 90% completed by end of December

## ACADEMIC CALENDAR

### DEPARTMENT OF ZOOLOGY

# January/February 2022 - May/June 2022

# 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> Semester

Semest er/ Year	Syllabus Module/ Unit	No. of Lecture	Teacher Name	Distributi on Tentative
SEM-II HONOURS	Non-Chordates II Paper Code: ZOOACOR03T	30		
	Unit 1: Introduction to Coelomates Evolution of coelom and metamerism	3	Dr. Indrajit Biswas	2nd week February
	Unit 2: Annelida General characteristics and Classification up to classes Excretion in Annelida	4	Dr. Indrajit Biswas	3r <sup>d</sup> week February
	Unit 3: Arthropoda General characteristics and Classification up to classes,Metamorphosis in Insects Social life in bees and termites	8	Dr. Indrajit Biswas	3rd Week of February-3 <sup>rd</sup> week of May
	Unit 4: Onychophora General characteristics	2		
	Unit 5: Mollusca General characteristics and Classification up to classes Respiration in Mollusca Torsion and detorsion in Gastropoda	6	Santanu Das	1 <sup>st</sup> week of February-3rd week of February
	Unit 6: Echinodermata General characteristics and Classification up to classes Water-vascular system in Asteroidea Larval forms in Echinodermata	4	Mr. Santanu Das	4 <sup>th</sup> week of February – 1 <sup>st</sup> week of May
	Unit 7: Hemichordata General characteristics of phylum Hemichordata. Phylogenetic relationship with non-chordates and chordates (only recent concept)	3	Smt. Rituparna Maity	2 <sup>nd</sup> week of February- 4 <sup>th</sup> week of February
	Non-Chordates II Lab Paper Code: ZOOACOR03P	30	Dr. Indrajit Biswas Smt. Rituparna Maity	Acc. To Revised Syllabus 90% completed by end of May
	CELL BIOLOGY PAPER CODE: ZOOACOR04T	30		
	Unit 1: Overview of Cells Prokaryotic and Eukaryotic cells, Virus, Viroids	2	Dr. S Rehan Ahmad	2nd week of February

Unit 2: Plasma Membrane Various models of plasma membrane structure Transport across membranes: Active and Passive transport, facilitated transport, Cell junctions: Tight junctions, Desmosomes, Gap junctions	5	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of February-1 <sup>st</sup> week of May
Unit 3: Endomembrane System Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes	4	Dr. S Rehan Ahmad	2 <sup>nd</sup> week May-end of May
Unit 4: Mitochondria and Peroxisomes Mitochondria: Structure, Semi-autonomous nature, Mitochondrial Respiratory Chain, Peroxisomes	4	Mr.Santa nu Das	2 <sup>nd</sup> week of May 3 <sup>rd</sup> week of May

	Unit 5: Cytoskeleton Structure and Functions: Microtubules, Microfilaments and Intermediate filaments	2	Mr. Santanu Das	1st week of May
	Unit 6: Nucleus Structure of Nucleus: Nuclear envelope, Nucleolus Chromatin: Euchromatin and Heterochromatin and packaging (nucleosome)	4	Dr. Anindya Sundar Bhunia	2 <sup>nd</sup> week of February -end of February
	Unit 7: Cell Division Mitosis and Meiosis Cell cycle and its regulation Mechanisms of cell death: brief overview	5	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May End of May
	Unit 8: Cell Signaling Cell signalling transduction pathways; Types of signaling molecules and receptors GPCR and Role of second messenger (cAMP)	4	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May End of May
	CELL BIOLOGY LAB PAPER CODE: ZOOACOR04P	30	Dr. Anindya Sundar Bhunia Dr. S Rehan Ahmad	Acc. To Revised Syllabus 90% completed by end of May
SEM-II GENERAL	PHYSIOLOGY AND BIOCHEMISTRY PAPER CODE: ZOOGCOR02T	30		
	Unit-1 Nerve and muscle 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.	4	Dr. Indrajit Biswas	2nd week of February-En d of February

Unit-2 Digestion Absorption of carbohydrates, proteins, lipids	2	Dr. Indrajit Biswas	1st week of May
Unit-3 Respiration Pulmonary ventilation, Respiratory volumes and capacities, Transport of Oxygen and carbon dioxide in blood	3	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of February- End of February
Unit-4 Excretion Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism	3	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May End of May
Unit-5 Cardiovascular system Composition of blood, Homeostasis, Structure of Heart, Origin and conduction of the cardiac impulse, Cardiac cycle	3	Smt. Rituparna Maity	1 <sup>st</sup> week of February- End of February
Unit-6 Reproduction and Endocrine Glands Physiology of male reproduction: hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle. Structure and function of thyroid, pancreas	4	Smt. Rituparna Maity	1 <sup>st</sup> week of May 1 <sup>st</sup> week of May
Unit 7 Carbohydrate: Structure and Metabolism Introduction to Carbohydrates, Structure & Types of Carbohydrates, Introduction to Intermediary metabolism: Glycolysis, Krebs cycle, Electron transport chain	4	Dr. S Rehan Ahmad	1 <sup>st</sup> week of February- End of February
Unit-8 Lipid: Structure and Metabolism Introduction to Lipids: Definitions; classes of lipids; $\beta$ oxidation of palmitic acid	2	Dr. S Rehan Ahmad	1 <sup>st</sup> week of May
Unit-9 Protein: Structure and metabolism	2	Mr. Santanu Das	1 <sup>st</sup> week of February

Proteins and their biological functions, functions of amino acids; primary structure of protein, secondary, tertiary and quaternary structures. Transamination, Deamination.			
Unit-10 Enzymes 4 Introduction, Classification of Enzymes, Mechanism of action,Enzyme Kinetics, Inhibition and Regulation	2	Mr. Santanu Das	3 <sup>rd</sup> week of February
PHYSIOLOGY AND BIOCHEMISTRY LAB PAPER CODE: ZOOGCOR02P	30	Smt. Rituparna Maity Dr. Anindya Sundar	Acc. To Revised Syllabus 90% completed by end of May

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SEM-IV HONOURS	COMPARATIVE ANATOMY PAPER CODE: ZOOACOR08T	30		
	Unit 1: Integumentary System- Structure, function and derivatives of integument in mammals	5	Santanu Das	2nd week of February-En d of February
	Unit 2: Skeletal System, Jaw Suspension	2	Santanu Das	1 <sup>st</sup> week of May
	Unit 3: Digestive System- Comparative anatomy of stomach; dentition in mammals	4	Smt. Rituparna Maity	2 <sup>nd</sup> week of February-3 <sup>rd</sup> week of February
	Unit 4: Respiratory System- Respiratory organs in birds	4	Smt. Rituparna Maity	4 <sup>th</sup> week of February- 2 <sup>nd</sup> week of May
	Unit 5: Circulatory System- Comparative account of heart and aortic arches	4	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of February-3 <sup>rd</sup> week of February
	Unit 6: Urinogenital System- Succession of kidney	3	Dr. S Rehan Ahmad	3 <sup>rd</sup> week of February-1 <sup>st</sup> week of May
	Unit 7: Nervous System Comparative account of brain, Cranial nerves in mammals	4	Dr. Indrajit Biswas	2 <sup>nd</sup> week of February-En d of February
	Unit 8: Sense Organs Classification of receptors	4	Dr. Indrajit Biswas	1 <sup>st</sup> week of May 2 <sup>nd</sup> week of May
	COMPARATIVE ANATOMY LAB PAPER CODE: ZOOACOR08P	30	Mr. Santanu Das Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by end of May
	PHYSIOLOGY: LIFE SUSTANING SYSTEM PAPER CODE: ZOOACOR09T	30		
	Unit 1: Physiology of Digestion-Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids, Proteins, Digestive enzyme	4	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of May 3 <sup>rd</sup> week of May
	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,	6	Dr. S Rehan Ahmad	3 <sup>rd</sup> week of May 1 <sup>st</sup> week of May

Unit 3: Physiology of Circulation- Components of Blood and their functions; Structure and functions of haemoglobin; Blood clotting system, Blood groups; ABO and Rh factor	4	Dr. Anindya Sundar Bhunia	2 <sup>nd</sup> week of February-3 <sup>rd</sup> week of February
Unit 4: Physiology of Heart- Structure of mammalian heart, Origin and conduction of cardiac impulses;	6	Dr. Anindya Sundar Bhunia	4 <sup>th</sup> week of February-2 <sup>nd</sup> week of May

Cardiac Cycle and cardiac output; Blood pressure and its regulation			
Unit 5: Thermoregulation & Osmoregulation Physiological classification based on thermal biology. Thermal biology of endotherms; Osmoregulation in aquatic vertebrates;	4	Smt. Rituparna Maity	3 <sup>rd</sup> week of May 1 <sup>st</sup> week of May
Unit 6: Renal Physiology Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid-base balance	6	Smt. Rituparna Maity	1 <sup>st</sup> week of May 4 <sup>th</sup> week of May
PHYSIOLOGY: LIFE SUSTAINING SYSTEM LAB PAPER CODE: ZOOACOR09T	30	Dr. Anindya Sundar Bhunia Smt. Rituparna Maity	Acc. To Revised Syllabus 90% completed by end of May
IMMUNOLOGY PAPER CODE: ZOOACOR10T	30		
			ord and a Char
Unit 1: Overview of Immune System-Organs (Primary & Secondary lymphoid organs and its importance) and Cells of the Immune system	1	Dr. Indrajit Biswas	3" week of May

mechanisms (Formation of Plasma B cells and Memory B cells [concept]			
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), Co-stimulatory molecules on APC.	4	Dr. Anindya Sundar Bhunia	3 <sup>rd</sup> week of May End of May
Unit 3: T Cell development Structure of T cell receptors, Co-stimulatory molecules on T cells, Central differentiation of T cells; T cell selection in thymus Peripheral differentiation of T cells; Th1 & Th2	4	Dr. Anindya Sundar Bhunia	1 <sup>st</sup> week of May 3 <sup>rd</sup> week of May
Unit 4: Immunoglobulins Structure and functions of different classes of immunoglobulins, Antigen antibody interactions, Immunoassays (ELISA and	4	Mr.Santa nu Das	2 <sup>nd</sup> week of May 4 <sup>th</sup> week of May

RIA), Hybridoma technology, Monoclonal antibody production			
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, GMCSF, M-CSF).	4	Mr. Santanu Das	End of May-2 <sup>nd</sup> week ofMay
Unit 7: Complement System Components and pathways of complement activation	2	Smt. Rituparna Maity	End of May
Unit 8: Hypersensitivity Gell and Coombs' classification and brief description of various types of hypersensitivities.	2	Smt. Rituparna Maity	End of May
Unit 9: Immunology of diseases Malaria, Dengue	2	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of May
Unit 10: Vaccines Various types of vaccines. Active & passive immunization (Artificial and natural).	2	Dr. S Rehan Ahmad	End of May

	IMMUNOLOGY LAB PAPER CODE: ZOOACOR10T	30	Dr. Anindya Sundar Bhunia Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by end of May
SEM-IV GENERAL	ENVIRONMENT AND PUBLIC HEALTH PAPER CODE: ZOOGCOR04T	30		
	Unit 1: Introduction Sources of Environmental hazards, Hazard identification and accounting, Fate of toxic and persistent substances in the environment, Dose response evaluation, Exposure assessment	8	Dr. Indrajit Biswas	2 <sup>nd</sup> week of February-En d of May
	Unit 2: Climate Change Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health	6	Dr. Anindya Sundar Bhunia	2 <sup>nd</sup> week February-en d of May
	Unit 3: Pollution Air, water pollution: sources and effects, Pollution control	8	Smt. Rituparna Maity	2 <sup>nd</sup> week of February-En d of May
	Unit 4: Waste Management Technologies Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal.	4	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of February-En d of May
	Unit 5: Diseases Causes, symptoms and control of tuberculosis, Asthma, Cholera.	2	Mr Santanu Das	2 <sup>nd</sup> week of February-4 <sup>th</sup> week of February
	ENVIRONMENT AND PUBLIC HEALTH PAPER CODE: ZOOGCOR04P	30	Dr. Indrajit Biswas Dr. S Rehan Ahmad	Acc. To Revised Syllabus 90% completed by end of May
SEM-VI HONOURS	DEVELOPMENTAL BIOLOGY PAPER CODE: ZOOACOR13T	30		
	Unit 1: Introduction Basic concepts: Phases of Development, Cell-cell interaction, Differentiation and growth	4	Smt. Rituparna Maity	2 <sup>nd</sup> week of February-3 <sup>rd</sup> week of February

Unit 2: Early Embryonic Development Gametogenesis, Spermatogenesis, Oogenesis; 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 chick up to gastrulation; Embryonic induction and organizers	8	Mr. Santanu Das	2 <sup>nd</sup> week of February-En d of February
Unit 3: Late Embryonic Development Fate of Germ Layers; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta)	6	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of February-4 <sup>th</sup> week of February
Unit 4: Post Embryonic Development Development of brain and Eye in Vertebrate	6	Dr. S Rehan Ahmad	4 <sup>th</sup> week of February-2 <sup>nd</sup> week of May
Unit 5: Implications of Developmental Biology Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis	6	Smt. Rituparna Maity	4 <sup>th</sup> week of February-1 <sup>st</sup> week of May
DEVELOPMENTAL BIOLOGY LAB PAPER CODE: ZOOACOR13P	30	Dr. S Rehan Ahmad Mr.Santa nu Das	Acc. To Revised Syllabus 90% completed by end of May
EVOLUTIONARY BIOLOGY PAPER CODE: ZOOACOR14T	30		
Unit 1: Origin of earliest life- Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes, three domains of life	2	Dr. Indrajit Biswas	2 <sup>nd</sup> week of February
Unit 2: Historical review of evolutionary concept-Pre Darwinian Concepts and theories including Lamarckism, Darwininan Theory Neo-Darwinian Synthesis	4	Dr. Indrajit Biswas	2 <sup>nd</sup> week of February-En d of February
Unit 3: Evidences in favour of Evolution-Fossil records: types of fossils, geological time scale, transitional forms:	2	Dr. S Rehan Ahmad	3 <sup>rd</sup> week of May

Unit 5: Population genetics- 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 equilibriumNatural 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 mechanism, basic concepts and examples of founder's effect, bottleneck phenomenon;	8	Mr.Santa nu Das	1 <sup>st</sup> week of May End of May
Unit 6: Products of evolution Inter-population variations: clines, races, Species concepts and modes of speciation (just outlines of Allopatric, Sympatric isolating mechanisms Adaptive radiations)	5	Smt. Rituparna Maity	2 <sup>nd</sup> week May-4 <sup>th</sup> week Of May

Unit 8: Origin and evolution of man-Unique hominin characteristics contrasted with primate characteristics (including social and cultural ones), Molecular evidences of human origin and migrations (brief outline)	6	Dr. Anindya Sundar Bhunia	2 <sup>nd</sup> week of February-4 <sup>th</sup> week of February
Unit 9: Molecular Phylogeny-Neutral theory of molecular evolution, molecular clock (brief introductions) Example of evolution in vertebrate globin genes	4	Dr. Anindya Sundar Bhunia	End of February 1 <sup>st</sup> week of May
EVOLUTIONARY BIOLOGY LAB PAPER CODE: ZOOACOR14P	30	Dr. Indrajit Biswas Santanu Das	
FISH AND FISHERY PAPER CODE: ZOOADSEO4T	30		
Unit 1: Introduction and Classification-Feeding habit, habitat and manner of reproduction Classification of fish (up to Subclasses) with important examples	2	Dr. Indrajit Biswas	1 <sup>st</sup> week of May
Unit 2: Morphology and Physiology Types of fins,Types of Scales, Use of scales in Classification and determination of age of fish; Gills and gas exchange; Swim Bladder: Types and role in	8	Dr. S Rehan Ahmad	4 <sup>th</sup> week of May 2 <sup>nd</sup> week of May

Respiration, buoyancy, Bioluminescence			
Unit 3: Fisheries Inland Fisheries; Marine Fisheries; Environmental factors influencing the seasonal variations in fish catches in the Arabian Sea and the Bay of Bengal; Fishing crafts and Gears; Depletion of fishery resources; Application of remote sensing and GIS in fisheries;	8	Mr.Santa nu Das	1 <sup>st</sup> week of May 3 <sup>rd</sup> week of May
Unit 4: Aquaculture Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Pen and cage culture; Polyculture; Composite fish culture; Brood stock management; Induced breeding of fish, Fish diseases	10	Smt. Rituparna Maity	End of May-3 <sup>rd</sup> week of May
Unit 5: Fish in research Transgenic fish	2	Dr. Anindya Sundar Bhunia	2 <sup>nd</sup> week of May
FISH AND FISHERYLAB PAPER CODE: ZOOADSE04P	30	Dr. S Rehan Ahmad Smt. Rituparna Maity	Acc. To Revised Syllabus 90% completed by end of May
PARASITOLOGY PAPER CODE: ZOOADSE05T	30		
Unit 1: Introduction to Parasitology Brief introduction of Parasitism and other animal associations, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship and zoonosis	2	Smt. Rituparna Maity	4 <sup>th</sup> week of May
Unit 2: Parasitic Protists Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Entamoeba histolytica, Giardia intestinalis, Leishmania donovani, Plasmodium vivax	10	Dr. Indrajit Biswas	2 <sup>nd</sup> week of May End of May

Unit 3: Parasitic Platyhelminthes Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of <i>Fasciola hepatica, Schistosoma</i> <i>haematobium, Taenia solium</i>	8	Mr. Santanu Das	3 <sup>rd</sup> week of May end of May
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	Unit 4: Parasitic Arthropoda Mosquitoes, as vectors of human pathogen Biology, importance and control of myiasis causing diptera Biology, importance and control of ticks, mites, <i>Pediculus</i> <i>humanus</i> (head and body louse),	8	Dr. Anindya Sundar Bhunia	3 <sup>rd</sup> week of May end of May
	PARASITOLOGY LAB PAPER CODE: ZOOADSE05P	30	Dr. S Rehan Ahmad Smt. Rituparna Maity	Acc. To Revised Syllabus 90% completed by end of May
SEM-VI GENERAL	IMMUNOLOGY PAPER CODE: ZOOGDSE04T	30		
	Unit-1 Overview of the Immune System Introduction to basic concepts in immunology, components of immune system, principles of innate and adaptive immune system	4	Dr. S Rehan Ahmad	2 <sup>nd</sup> week of February-En d of February
	Unit-2 Cells and Organs of the Immune System Cells of immune system and organs (primary and secondary lymphoid organs) of the immune system	4	Dr. Anindya Sundar Bhunia	2 <sup>nd</sup> week of February-En d of February
	Unit-3 Antigens Basic properties of antigens, B and T cell epitopes, haptens and adjuvants	6	Dr. S Rehan Ahmad	End of February end of May
	Unit-4 Antibodies Structure, classes and function of antibodies, antigen antibody interactions as tools for research and diagnosis	4	Smt. Rituparna Maity	2 <sup>nd</sup> week of February-En d of February
	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,	4	Santanu Das	2 <sup>nd</sup> week of February-En d of February
	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	6	Dr. Indrajit Biswas	2 <sup>nd</sup> week of February-2 <sup>nd</sup> week of May
	Ùnit-7 Vaccines General introduction to vaccines, Types of vaccines	2	Dr. Indrajit Biswas	3 <sup>rd</sup> week of May
	IMMUNOLOGY LAB PAPER CODE: ZOOGDSE04P	30	Dr. Anindya Sundar Bhunia Mr. Santanu Das	Acc. To Revised Syllabus 90% completed by end of May

# ACADEMIC CALENDAR

#### DEPARTMENT OF ZOOLOGY

July 2022- January2023

## 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> Semester

Semester	(Hono/Gonoral)	Syllabus		No. of	No. of Teacher	Distribution
	(Holis/General)	Module/ Unit	Торіс	(Hours)	Name	
SEM-I	HONOURS	Non-Chordates I Paper Code: ZOOACOR01T		30		
		Unit 1	Protista, Parazoa and Metazoa			
			General characteristics and			
			Classification up to classes, Study of	6	Dr. Indrajit Biswas	Sepetember'22-N ovember'22
			nathogenicity of Entamoeba			
			histolytica and Plasmodium vivax			
		Unit 2	Porifera			
			General characteristics and	_	Dr. Indrajit	November'22-1st
			Classification up to classes Canal	5	Biswas	January'23
			system and spicules in sponges			
		Unit 3	Cnidaria			
			General characteristics and			
			Classification up to classes		Santanu	September'22-No
			Polymorphism in CnidariaCorals and	6 Das	vember'22	
			coral reefs: types, formation,			
			distribution, conservation			
		Linit 4	Significance			
		01111 4	General characteristics	2	Santanu Das	November'22-No vember'22
		Unit 5	Platyhelminthes			
			General characteristics and		Dr. Anindva	September'22-No
			Classification up to classes, Life cycle	6	Sundar	vember'22
			and pathogenicity of <i>Fasciola</i>		Bhunia	
		Linit 6	Nemathelminthes			
			General characteristics and			
			Classification up to classes. Life cycle.		Dr. Anindva	November'22-1st
			and pathogenicity of Ascaris	5	Sundar	week of
			<i>lumbricoides,</i> Parasitic adaptations in		Bhunia	January 25
			helminths			
		Non-Chordates I			Dr. Indrajit	September'22-1s
		Lab Paper Code		30	Biswas	t week of
		ZOOACOR01P			Das	January'23
		ECOLOGY				
		ZOOACOR02T		30		
			Unit 1: Introduction to Ecology			
			History of ecology, Autecology			
			and synecology, Levels of	6	Rituparna	September'22-No
			organization, Laws of limiting		Maity	vember'22
			factors, Study of Physical			
			factors, The Biosphere.			

			Unit 2: Population life tables, survivorship curves, exponential and logistic growth, r and K strategies Population regulation - density- dependent and independent factors	10	Rituparna Maity	November'22-1st week of January'23
			Unit 3: Community Community characteristics: species diversity, abundance, dominance, richness, Ecotone, Ecological succession and example of it.	5	Dr. S Rehan Ahmed	September'22-1s t week of January'23
			Unit 4: Ecosystyem Food chain: Detritus and grazing food chains,Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies	6	Dr. S Rehan Ahmed	November'22-1st week of January'23
			Unit 5: Applied Ecology Wildlife Conservation (in-situ and ex-situ conservation). Wild life protection act (1972)	3	Santanu Das	November'22-1st week of January'23
		ECOLOGY LAB PAPER CODE: ZOOACOR02P		30	Rituparna Maity	September'22-1s t week of January'23
	GENERAL	ANIMAL DIVERSITY PAPER CODE: ZOOGCOR01T		30		
SEM-I		Unit-1	Kingdom Protista General characters and classification of Subkingdom Protozoa up to Phylum (Levine et al., 1980)	2	Dr. Indrajit Biswas	September'22-Se ptember'22
		Unit-2	Phylum Porifera General character and classification up to classes; Canal System in Sycon	2	Dr. Indrajit Biswas	September'22-No vember'22
		Unit-3	Phylum Cnidaria General characters and classification up to classes	1	Dr. Indrajit Biswas	November'22 1st week of January'23
		Unit-4	Phylum Platyhelminthes General characters and classification up to classes; Life history of Taenia solium	3	Dr. Indrajit Biswas	November'22-1st week of January'23
		Unit-5	Phylum Nematoda General characters and classification up to classes; Life history of Ascaris lumbricoides	3	Dr. Anindya Sundar Bhunia	September'22-Se ptember'22
		Unit-6	Phylum Annelida General characters and classification up to classes	1	Dr. Anindya Sundar Bhunia	September'22-Se ptember'22
			Phylum Annelida General characters and classification up to classes;	1	Dr. Anindya Sundar Bhunia	November'22- 1st week of January'23
		Unit 7	Phylum Arthropoda General characters and classification up to classes Metamorphosis in Insects	2	Dr. Anindya Sundar Bhunia	November'22- 1st week of January'23

		Unit-8	<b>Phylum Mollusca</b> General characters and classification up to classes; Respiration in Pila	2	Dr. Anindya Sundar Bhunia	November'22-1st week of January'23
		Unit-9	Phylum Echinodermata General characters and classification up to classes; Water-vascular system in Asterias	2	Rituparna Maity	November'22-1st week of January'22(1st Week)
		Unit-10	Protochordates General features	1	Rituparna Maity	September'22-Se ptember'22
		Unit-11	Agnatha General features and classification up to classes (Young, 1981)	1	Rituparna Maity	September'22-No vember'22
		Unit-12	<b>Pisces</b> General features and Classification up to Subclasses (Romer, 1959); Osmoregulation in Fishes	2	Rituparna Maity	November'22- Febraary'22
		Unit-13	<b>Amphibia</b> General features and Classification up to living orders (Duellman & Trueb, 1986); Metamorphosis in Toad	2	Santanu Das	September'22-No vember'22
		Unit-14	<b>Reptiles</b> General features and Classification up to living Subclass (Young, 1981); Poisonous and non- poisonous snakes	2	Santanu Das	November'22- 1st week of January'23
		Unit-15	<b>Aves</b> General features and Classification up to orders (Young, 1981); Flight adaptations in birds	2	Dr. S Rehan Ahmed	September'22-No vember'22
		Unit-16	Mammals Classification up to Subclasses (Young, 1981)	1	Dr. S Rehan Ahmed	November'22-
		ANIMAL DIVERSITY PAPER CODE: ZOOGCOR01P		30	Rituparna Maity Dr. Anindya Sundar Bhunia	September'22-1s t week of January'23
SEM-III	HONOURS	CHORDATES PAPER CODE: ZOOACOR05T		60		
		Unit 1	Introduction to Chordates General characteristics and outline classification of Phylum Chordata	4	Rituparna Maity	September"22-Se ptember"22
		Unit 2	Protochordata General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Metamorphosis in Ascidia Chordate Features and Feeding in Branchiostoma	8	Rituparna Maity	September"22-O ctober"22
		Unit 3	Origin of Chordata Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata	5	Rituparna Maity	October"22-Octo ber"22
		Unit 4	Agnatha General characteristics and	2	Rituparna Maity	November"22

		classification of cyclostomes up to			
		order			
Unit	5	Pisces			
		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	10	Rituparna Maity	November"22- October'22
Unit	6	Amphibia			
		General characteristics and classification up to living Orders Metamorphosis with parental care	5	Dr. S Rehan Ahmed	September"22-Se ptember"22
Unit	7	Reptilia			
		General characteristics and		Dr. S	Contombor"22.0
		classification up to living Orders	7	Rehan	ctober"22
		Poison apparatus and Biting		Anneu	
		mechanism in Snake			
Unit	8	Aves			
		classification up to Sub-Classes, Exoskeleton and migration in Birds, Principles and aerodynamics of flight	7	Dr. S Rehan Ahmed	October"22-Nove mber"22
Unit	9	Mammals			
		General characters and classification up to living orders, Phylogenetic significance of Prototheria Exoskeleton derivatives of mammals Adaptive radiation in mammals with reference to locomotory appendages Echolocation in Microchiropteransand Cetaceans	10	Dr. S Rehan Ahmed	September"22-N ovember"22-
Unit	10	Zoogeography			
		Zoogeographical realms, Plate tectonic and Continental drift theory, Distribution of birds and mammals in different realms	2	Dr. S Rehan Ahmed	January'23 (1 <sup>st</sup> week)
CHORDAT PAPER C ZOOACC	ES LAB CODE: DR05P		60	Santanu Das Rituparna Maity	Acc. To Revised Syllabus 90% completed by end of November
PHYSIOI PAPER C ZOOACC	LOGY CODE: DR06T		60		
Unit	1	Tissues			
		Structure, locations, classification and functions of epithelial tissues, connective tissues, muscular tissues and nerve tissues	10	Dr. Indrajit Biswas	September"22-Ju ly20
Unit	2	Bone and Cartilage			
		Structure and types of bones and cartilages,Ossification	5	Dr. Indrajit Biswas	October"22-Nove mber"22
Unit	3	Nervous System	15	Dr. Indrajit Biswas	November"22-No vember'22

		Structure of neuron resting			
		mombrane notential Origin of action			
		netontial and its propagation accord			
		the muslimeted and upmuslimeted			
		the myelinated and unmyelinated			
		nerve fibers; Types of synapse,			
		Synaptic transmission and			
		Neuromuscular junction, Reflex			
		action and its types			
	Unit 4	Muscular system			
		Histology of different types of			
		muscle; Ultra structure of skeletal	40	Santanu	September"22-O
		muscle; Molecular and chemical	10	Das	ctober"22
		basis of muscle contraction.			
		Characteristics of muscle fiber			
	Linit 5	Benroductive System			
		Histology of testis and overy:	5	Santanu	November"22-se
		Ristology of testis and ovary,	5	Das	ptember'22
	Unit 6	Endocrine System			
		Histology and function of			
		pituitary,thyroid,Pancreas, and			
		adrenal. Classification of hormones;			
		Mechanism of Hormone action;			
		Signal transduction pathways for		Dr. S	September'22-De
		Steroidal and Non-steroidal	15	Rehan	cember'22(1 <sup>st</sup>
		hormones; Hypothalamus		Ahmed	Week)
		(neuroendocrine gland) - principal			
		nuclei involved in neuroendocrine			
		control of anterior pituitary and			
		endocrine system: Placental			
		bormones			
-		normones		Dr	
	PAPER CODE:			Anindya	
	ZOOACOR06T			Sundar	Syllabus 90%
			60	Bhunia	completed by
				Dr. S	end of December
				Ahmed	
	BIOCHEMISTRY			, united	
	PAPER CODE:		60		
	ZOOACOR07T				
	Unit 1				
		Fundamentals of biochemical			
		reactions and metabolism			
		Ionization of water weak acids and			
		bases buffering and pH changes in			
		living systems, Metabolism:			
		Catabolism and Anabolism,		D.C	
		Compartmentalization of metabolic	10	Dr. S Rehan	September"22-O
		nathways		Ahmed	ctober"22
		Shuttle systems and membrane			
		transporters;-ATP as "Energy			
		Currency of cell"; coupled reactions;			
		Use of reducing equivalents and			
		cofactors; Intermediary metabolism			
		and regulatory mechanisms			

Unit 2	Carbohydrates Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosachharides, Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis	10	Dr. S Rehan Ahmed	October"22-Sept ember'22
Unit 3	Lipids Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Triacylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpinoids. Lipid metabolism: β-oxidation of fatty acids; Fatty acid biosynthesis	4	Dr. S Rehan Ahmed	October'22-Nove mber'22
Unit 4	Proteins Amino acids Structure, Classification, General and Electro chemical properties of α-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	14	Dr. Anindya Sundar Bhunia	September"22-N ovember"22
Unit 5	Nucleic Acids Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids Types of DNA and RNA, Complementarity of DNA,-Hypo- Hyperchromaticity of DNA Outlines of nucleotide metabolism	4	Dr. Indrajit Biswas	September"22-O ctober"22
Unit 6	Enzymes 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	12	Dr. Anindya Sundar Bhunia	September'22-Oc tober'22

			each)			
		Linit 7	Oxidative Phosphorylation			
		Onic /	Dedex systems: Deview of		Dr.	
			Redox systems; Review of	6	Anindya	November'22-De
			mitochondrial respiratory chain,		Sundar	week)
			Inhibitors and un-couplers of		Bhunia	
		BIOCHEMISTRY	Electron Transport System		Dr	
					Anindva	Acc. To Revised
		CODE:		60	Sundar	Syllabus 90%
		ZOOACOR07T			Bhunia Dr.	completed by
					S Rehan	end of December
		SEC:				
		SERICULTURE		15	Dr. Indrajit Biswas	4 weeks in
		SEC LAD			DI3W83	December'22
		SEC LAB:		15	Dr. Indrajit Biswas	
SEM-III	GENERAL	INSECT VECTOR				
		AND DISEASES		60		
		ZOOGCOR03T				
		Unit-1	Introduction to Insects General			
			Features of Insects, Morphological			
			features, Head – Eyes, Types of	4	Dr. Indrajit	September"22-O
			antennae Mouth parts with respect		DISWas	
			to feeding habit			
		Unit-2	Concept of Vectors			
			Brief introduction to Vectors		Dr	
			(mechanical and biological),	6	Anindya	September'22-Oc
			Reservoirs, Host-vector relationship,	0	Sundar Bhunia	tober"22
			Adaptations as vectors, Host			
			specificity			
		Unit-3	Insects as Vectors			
			Detailed features of insect orders as	6	Dr. S Pohan	September"22-O
			vectors – Diptera, Siphonoptera,		Ahmed	ctober"22
			Siphunculata, Hemiptera			
		Unit-4	Dipteran as Disease Vector			
			Study of important Dipteran vectors			
			<ul> <li>Mosquitoes, Sand fly, Houseflies</li> </ul>		Diturner	Sepetember'22-D
			vectors Study of mosquito-borne	16	Maity	ecember'22(1 <sup>st</sup>
			diseases – Malaria, Dengue,			Week)
			Chikungunya, Viral encephalitis,			
			Filariasis Control of mosquitoes			
		Unit-5	Siphonaptera as Disease Vectors			
			Fleas as important insect vectors;		Ritunarna	Sentember"22-N
			Host-specificity, Study of Flea-borne	10	Maity	ovember"22
			diseases – Plague, Typhus fever;			
			Control of fleas			
		Unit-6	Siphunculata as Disease Vectors			
			Human louse (Head, Body and Pubic	8	Santanu	September"22-N
			louse) as important insect vectors;		Das	ovember"22
			Control of human louse			
		Unit-7	Hempitera as Disease Vectors			
			Bugs as insect vectors; Blood-sucking	40	Santanu	September'22-No
			bugs; Chagas disease, Bed bugs as	10	Das	vember'22
			mechanical vectors, Control and			
		INSECT VECTORE	prevention measures			Acc. To Revised
		AND DISEASES			Dr. Indrajit	Syllabus 90%
		PAPER CODE:		60	Biswas	completed by
		ZOOGCOR03P				end of December

SEM-V	HONOURS	MOLECULAR BIOLOGY PAPER CODE: ZOOACOR11T		60		
		Unit 1	<b>Nucleic Acids</b> Salient features of DNA and RNA Watson and Crick Model of DNA	2	Dr. Anindya Sundar Bhunia	September"22-Se ptember"22
		Unit 2	DNA Replication Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres	6	Dr. Anindya Sundar Bhunia	September"22-O ctober"22
		Unit 3	Transcription Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.	8	Dr. Anindya Sundar Bhunia	September"22-N ovember"22
		Unit 4	Translation 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	14	Dr. Indrajit Biswas	September"22-N ovember"22
		Unit 5	Post Transcriptional Modifications and Processing of Eukaryotic RNA 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	10	Dr. Indrajit Biswas Dr. Anindya Sundar Bhunia	September"22-N ovember"22
		Unit 6	Gene Regulation Regulation of Transcription in prokaryotes: lac operon and trp operon; Regulation of Transcription in eukaryotes	5	Dr. Indrajit Biswas	Septembar'22-Oc tobar'22
		Unit 7	DNA Repair Mechanisms Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair	9	Rituparna Maity	September"22-N ovember"22
		Unit 8	Molecular Lab Techniques PCR, Western and Southern blot, Northern Blot,Sanger DNA sequencing, cDNA technology	5	Rituparna Maity	November"22-Se ptember'22
		MOLECULAR BIOLOGY LAB PAPER CODE: ZOOACOR11P		60	Dr. Anindya Sundar Bhunia	Acc. To Revised Syllabus 90% completed by end of December

				Dr. Indrajit Biswas	
	GENETICS PAPER CODE: ZODACOP12T		60		
	Unit 1	Mendelian Genetics and its			
		Extension Background of Mendel's			
		experiments Principles of Mendelian			
		inheritance,			
		Incomplete dominance and	12	Santanu	September"22-0
		co-dominance, Epistasis, Multiple		Das	ctober"22
		alleles, Lethal alleles, Pielotropy,			
		sex-limited inheritance. Polygenic			
		Inheritance			
	Unit 3	Mutations			
		1.Types of gene mutations			
		(Classification), Types of			
		chromosomal aberrations			
		(Classification with one suitable			
		example of each), Chromosomal			
		aberrations, gene mutations and			
		Klienfelter's Turner's Cri du Chat			
		Sickle cell. Haemophilia.	12	Santanu	November"22-Se
		Thallassimia, Albinism only		Das	petember'22
		genetical aspects here, details of			
		physiological consequences not			
		required), Sex chromosomes and			
		sex-linked inheritance			
		Non-disjunction and variation in			
		chromosome number; Molecular			
		light and chemical mutagen			
-	Unit 4	Sex Determination			
		Mechanisms of sex determination in			
		Drosophila with reference to			
		alternative splicing Sex	12	Dr. Indrajit Biswas	October"20
		determination in mammals,-Dosage			
		compensation in Drosophila &			
		Human			
	Unit 5	Extra-chromosomal Inheritance			
		inheritance Antibiotic resistance in	8	Dr. S Rehan	September"22-O
		Chlamyadomonas, Kappa particle in	_	Ahmed	ctober"22
		Paramoecium Shell spiralling in snail			
	Unit 6	Recombination in Bacteria and			
		Viruses		Dr. S	October"22-Nove
		Conjugation, Transformation,	8	Rehan	mber"22
		Iransduction, Complementation test		Anneu	
	Linit 7	In Bacteriophage			
		Transposons in bacteria		D- C	
		Ac-Ds elements in maize and P	8	Rehan	September"22-N
		elements in Drosophila, LINE, SINE,		Ahmed	ovember"22
		Alu elements in humans			
	GENETICS LAB			Dr. S	Acc. To Revised
	ZOOACOR12P		60	Rehan	completed by
				Anmed	end of December

		ENTOMOLOGY PAPER CODE:		60		
		ZOOADSEO2T				
		Unit 1	Introduction			
		General Features of Insects	2	Dr. Indrajit	September"22	
			Distribution and Success of Insects		DISWdS	
			on the Earth			
		Unit 2	Insect Diversity and Classifications			
			classifications of Arthropods with			
			are to be classified up to order) with			
			estimated species richness of the			
			orders globally in India and in West	4	Dr. Indrajit Biswas	September"22-O ctober"22
			Bengal.			
			Conspicuous/important			
			families/Genera/species of each			
			order have to be noted with their			
			peculiar habits and habitats)			
		Unit 3	General Morphology of Insects			
			(brief outlines)			
			External Features; Head – Eyes,			
			Types of antennae, Mouth parts		Dr Indraiit	October"22-Nove
			w.r.t. feeding habits	12	Biswas	mber"22
			Thorax: Wings and wing types, Types			
			of Legs adapted to diverse habitats,			
			recullar Abdominal appendages and			
		Linit A	Physiology of Insects			
		onit 4	Structure and physiology of Insect			
			body systems - Integumentary.			
		digestive, excreto	digestive, excretory, circulatory,			
			respiratory, endocrine, reproductive,			
			and nervous system (brief outlines	40	Dr. Indrajit	September'22-Oc
			only)-Photoreceptors: Types,	10	Biswas	tober'22
			Structure and Function (brief			
			introductions)			
			Metamorphosis: Types and			
			Neuroendocrine control of			
			metamorphosis (introductory)			
		Unit 5	Insect Society			
			Social insects: different types of			October'22-Nove
			their social systems Trophallavis in	8	Dr. Indrajit Biswas	mber'22
			social insects such as ants termites			
			and bees			
		Unit 6	Insect Plant Interaction			
			Outline of the concept of			
			co-evolution, role of allo-chemicals			
			in host plant mediation, Host-plant	14	Dr. Indrajit Biswas	November'22
			selection by phytophagous insects;		2.5.005	
			Major insect pests in paddy (brief			
			introductions)			
		Unit 7	Insects as Vectors			
			Insects as mechanical and biological		Dr. Indraiit	End In 1 <sup>st</sup> Week of January'23
			vectors, Brief discussion on	4	Biswas	
			nousefiles and mosquitoes as			
			important vectors			

		BIOLOGY OF INSECTS LAB PAPER CODE: ZOOADSE02P		60	Dr. Indrajit Biswas	Acc. To Revised Syllabus 90% completed by 1 <sup>st</sup> Week of January'23
		ENDOCRINOLOGY PAPER CODE: ZOOADSE03T		60		
		Unit 1	Introduction to Endocrinology General idea of Endocrine systems, Classification, Characteristic and Transport of Hormones Neurosecretions and Neurohormones	12	Rituparna Maity	September'22-no vember'22
		Unit 2	Epiphysis, Hypothalamo-hypophysial Axis Structure of pineal gland, Secretions and their functions in biological rhythms and reproduction; Structure and functions of hypothalamus and Hypothalamic nuclei, Regulation of neuroendocrine glands, Feedback mechanisms; Structure of pituitary gland, Hormones and their functions, Hypothalamo-hypophysial portal system, Disorders of pituitary gland.	18	Santanu Das	September'22-No vember'22
		Unit 3	Peripheral Endocrine Glands Structure, Hormones, Functions and Regulation of Thyroid gland, Parathyroid, Adrenal, Pancreas, Ovary and Testis; Hormones in homeostasis,Disorders of endocrine glands	16	Dr. Anindya Sundar Bhunia	September'22-1s tWeek of december'22
		Unit 4	Regulation of Hormone Action Mechanism of action of steroidal, non-steroidal hormones with receptors Bioassays of hormones using ELISA and RIA; Estrous cycle in rat and menstrual cycle in human Multifaceted role of Vasopressin & Oxytocin; Hormonal regulation of parturition	14	Dr. S Rehan Ahmed	September'22-1s tWeek of December'22
		ENDOCRINOLOGY LAB PAPER CODE: ZOOADSE03P		60	Dr. Indrajit Biswas Dr. Anindya Sundar Bhunia	Acc. To Revised Syllabus 90% completed by 1st week of January '23
SEM-V	GENERAL	APPLIED ZOOLOGY PAPER CODE: ZOOGDSE01T		60		
		Unit-1	Introduction to Host-parasite Relationship Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis	2	Dr. Indrajit Biswas	September"22-Se ptember"22
		Unit-2	<b>Epidemiology of Diseases</b> Transmission, Prevention and control of diseases: Tuberculosis, Typhoid	4	Dr. Indrajit Biswas	September"22-O ctober"22

	Unit-3	Rickettsia and Spirochetes	6	Dr. S Rehan Ahmed	September"22-O ctober"22
		Brief account of Rickettsia			
		prowazekii, Borrelia recurrentis and			
		Treponema pallidum			
	Unit-4	Parasitic Protozoa		Dr.	
		Life history and pathogenicity of	8	Anindya Sundar Bhunia	September"22-N ovember"22
		Entamoeba histolytica, Plasmodium			
		vivax and Trypanosoma gambiense			
	Unit-5	Parasitic Helminthes	4	Dr. Anindya Sundar Bhunia	
		Life history and pathogenicity of			September'22-Oc
		Ancylostoma duodenale and			tober'22
		Wuchereria bancrofti			
	Unit-6	Insects of Economic Importance		Dr. S Rehan Ahmed	
		Biology, Control and damage caused			November"22-No vember'22
		by Helicoverpa armigera, Pyrilla	12		
		perpusilla and Papilio demoleus,			
		Callosobruchus chinensis, Sitophilus			
		oryzae and Tribolium castaneum			
	Unit-7	Insects of Medical Importance	8	Dr. Indrajit Biswas	October'22-Nove mber'22
		Medical importance and control of			
		Pediculus humanus corporis,			
		Anopheles, Culex, Aedes, Xenopsylla			
		cheopis			
	Unit-8	Animal Husbandry		Rituparna Maity	September"22-O ctober"22
		Preservation of semen and artificial	6		
		insemination in cattle			
	Unit-9	Poultry Farming	6	Rituparna Maity	Sentember-Nove
		Principles of poultry breeding,			mber"22-
		Management of breeding stock and			
		broilers, Processing and preservation			
		of eggs Unit			
	Unit-10	Fish Technology	4	Rituparna	October'22-Nove
		Genetic improvements in		liviality	
		aquaculture industry; Induced			
		preeding and transportation of fish			
		seea	60	Cantanii	Acc. To Device d
	ZOOLOGY LAB			Das	Syllabus 90%
	PAPER CODE:				completed by
	ZOOGDSE01P				end of December