LESSON PLAN:SEMESTER-I

DEPARTMENT: ZOOLOGY

NAME OF FACULTY: DR. SUMALLYA KARMAKAR,SUCHONA CHAKRABORTY DR. DEBJANI DAS GHOSH &DR. PATRALEKHA MUKHOPADHYAY

Subject: Zoology Hons. (Major)

Paper: Core Course (Cell Biology)-CC1

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments (Concerned Teacher)**
Unit 1 , ,	**Plasma membrane**	**7**	1.The Cell : G.M. Cooper 2.Cell & Molecular Biology : Karp	1. Chalk & Talk method 2.PDF 3.Reference Notes	Suchona Chakraborty
	Lipid Bilayer	1			
	Peripheral & integral protein , Glycoprotein & Glycolipid	1			
	Fluid Mosaic model	1			
	Mobility of Membrane lipid & protein	1			
	Cell –cell junction	1			
	Transport through cell membrane	2			
Unit 2	**Cytoplasmic organelle –I**	**8**			
	ER – Morphology, Protein targeting, Signal hypothesis, Protein Insertion, folding & export.	3			
	Golgi body - Morphology, Protein glycosylation, sorting & export	2			
	Vesicular Transport – Cargo selection, Vesicle fusion	2			
	Lysosome –Polymorphism,	1			

	Endocytosis, Formation				
Unit 3	**Cytoplasmic organelles- II**	**5**			Dr. Sumallya Karmakar
	Mitochondria: Structure, Semi-autonomous nature, Mitochondrial DNA, Endosymbiotic hypothesis Mitochondrial Respiratory Chain, Chemiosmotic hypothesis and Oxidative Phosphorylation with reference to ATP Synthase and ATP synthesis	3	The Cell: Bruce Alberts	1. Chalk & Talk method 2. PPT	
	Peroxisomes: Structure and Functions; **Centrosome** and its organization	2	The Cell: Bruce Alberts	1. Chalk & Talk method 2. PPT	
Unit 4	**Cytoskeleton**	**4**			Dr. Sumallya Karmakar
	Structure and Types: Microtubules, Actin filaments, and Intermediate filaments; Basic composition and function of ECM; Cell matrix Interactions(Integrins)	4	The Cell: Bruce Alberts	1. Chalk & Talk method 2. PPT	
Unit 5	**Nucleus**	**5**			Dr. Sumallya Karmakar
	Nuclear envelope, nuclear pore complex (transport not included), Kinetochore and centromeric DNA; Chromatin and levels of its packaging. Euchromatin & Heterochromatin, Position effect variegation. Chromatin remodeling complex.	5	The Cell: Bruce Alberts	1. Chalk & Talk method 2. PPT	
Unit 6	**Cell cycle**	**11**			Dr. Sumallya Karmakar
	Cell Cycle: Phases of the eukaryotic cell cycle, Protein Kinases and Cell cycle regulation, MPF, Growth factors and regulation of G1-Cdks, S phase and regulation of DNA replication, DNA damage checkpoints	6	Concepts of Genetics: Klugg and Cumings	1. Chalk & Talk method 2. PPT	

	Cell Death: Caspases, Bcl-2 family, Intrinsic (Death receptors) and Extrinsic Pathway (apoptosome);	2	Concepts of Genetics: Klugg and Cumings	1. Chalk & Talk method 2. PPT	Dr. Sumallya Karmakar
	Cancer: Basic Concept of Protooncogene [Ras] & Tumor suppressor genes [Rb and p53] Different ways of activation of a protooncogene to Oncogene.	3	Concepts of Genetics: Klugg and Cumings	1. Chalk & Talk method 2. PPT	
Unit 7	**Cell Signalling**	**5**	1. Karp's Cell and Molecular Biology, 2. De Robertis Cell and Molecular biology etc	1.PPT 2.PDF 3.Chalk and talk	Dr. Debjani Das Ghosh
	Signalling system:modes of cell-cell signalling	1			
	Types of signalling molecules	1			
	Signalling receptors: G protein,	1			
	Signalling receptors: adenyl cyclase cAMP	1			
	Signalling receptors:RTK, JAK-STAT JAK/STAT	1			
Unit 8	**Tools and Techniques in Cell Biology**	**5**			
	Animal Cell Culture: Primary cell culture and Cell line. Subcellular fractionation and Ultracentrifugation	2			Dr. Sumallya Karmakar
	Freeze fracture Replication and Freeze Etching	1			

	Principle of Light Microscope: Bright field, Phase contrast microscope, Fluorescence Microscope with reference to FRET, Principle of SEM & TEM.	1			
	Cryofixation & use of frozen specimen	1	1.The Cell: G.M. Cooper 2.Cell & Molecular Biology: Karp	1. Chalk & Talk method 2.PDF 3.Reference Notes	Suchona Chakraborty
Practical	**Cell Biology Lab**	**20**			
	1. Cell viability study by Trypan Blue Exclusion method	3			Dr. Sumallya Karmakar
	2.Standardization of Ocular and Stage Micrometer	4	Modern Approach to Practical Botany: Santra & Maji	1. Chalk & Talk method 2.Use of Compound Microscope, Stage micrometer & Ocular micrometer	Dr. Patralekha Mukhopadhyay
	Measurement of microscopic specimen such as *Paramoecium* sp	6			
	3.Preparation of squamous epithelial cell with staining	04	1. Practical Zoology: Ghosh K.C., Manna B. 2.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay S., Das S.K. 3. Practical Zoology: Chatterjee A.K., Chakraborty C.	Use of Microscope, staining set & instruments	Suchona Chakraborty
	4. Isolation of Bone Marrow Cells from Rat/Mouse and Giemsa Staining	3			Dr. Sumallya Karmakar

LESSON PLAN: SEMESTER I
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: DR. PATRALEKHA MUKHOPADHYAY, DR. SUCHARITA SAHA, DR. DEBJANI DAS GHOSH

Subject: Zoology Hons. (Major)

Paper: Skill Enhancement Course (Applied Entomology)-SEC-1

Planned				**After Implementation**	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Basics of Entomology**	**15**	1. The Insects: Structure and function: Chapman, R.F. 2. A general Textbook of Entomology: Imms, A.D. 3. Textbook of Zoology, Invertebrates: Parker & Haswell	1.Chalk & Talk method 2.Use of LCD projector 3.Power Point presentation 4.Use of Charts, microscopes	Dr. Patralekha Mukhopadhyay
	Insect diversity and adaptation	4			
	Physiological adaptation in cockroach	3			
	General characteristics of Class Insecta and living orders with examples	5			
	Ticks and mites: General features, Difference between Ticks and mites, soft ticks and hard ticks	3	Hati A.K.(2010), Medical Entomology, Allied book agency	1.Chalk and talk 2.Link share	Dr. Sucharita Saha
Unit 2	**Medical Entomology**	**14**	1. Medical Entomology: Hati,A.K. 2. Parasitology: K.D. Chatterjee	1.Chalk & Talk method 2.Use of LCD projector 3.Power Point presentation 4.Use of Charts, microscopes	Dr. Patralekha Mukhopadhyay
	Concept of vectors	2			
	Biology of *Anopheles,Culex* and *Aedes*	6			
	Biology of *Musca domestica*	1			
	Biology and systematics of Bed bug *Cimex lectularius*	1			
	Ticks as causative agents and vectors, Ricketsiosis, Tick-borne encephalitis.	2	1.Medical Entomology, 4th edition, Baron. S (editor) Galveston (TX); University of Texas Medical	1.Chalk and talk 2. Link share	Dr. Sucharita Saha

			Branch at Galveston (1996)		
	Forensic Entomology: Insects and other Arthropods of forensic importance, pattern of insect succession on caracass, postmortem interval (PMI) and its estimation process	1	1.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3296382 2.Volckaert Helena (2020)" current applications and limitations of forensic entomology" 3.Themis: Research Journal of justice Studies and Forensic Science, Vol-8, article-4.		
	Application and limitations of Forensic Entomology	1			
Unit-3	**Agricultural Entomology**	**14**	1. Shukla & Upadhyay, Economic Zoology 2. Introduction to Economic Zoology: Sarkar, Kundu, Chaki 3. Elementary Applied Zoology: Debajyoti Chattopadhyay	1.Chalk & Talk method 2. Use of LCD projector 3.Power Point presentation 4.Use of Charts	Dr. Patralekha Mukhopadhyay
	1.Concept of insect pest, EIL, ETL	3			
	2. Life cycle, Nature of damage and control measures of pests of major crops	8			
	3.Insect Pest Control	2			
	4. Study of appliances used in pest control	1			
Unit 4	**Sericulture**	**7**	1.A.Sukla:A handbook of economic Zoology 2.Chaudhuri : Economic Zoology etc.	1. Photographs 2. PDF 3.Chalk and talk	Dr.Debjani Das Ghosh
	Types of silk moths, geographical distribution, host plants	1			
	Life cycle of *B.mori*, structure of silk gland,voltinism	1			
	Rearing, reeling, extraction of silk	1			
	Mulberry cocoon management, plan types & cultivation	1			
	Common diseases and pests and control measures	1			
	Prospects of sericulture in West Bengal	1			
	Employment potential in	1			

	sericulture				
Unit 5	**Apiculture**	**5**			
	Various domesticated species of Honey bee	1			
	Social organization and life cycle of honey bee	1			
	Modern method of bee keeping, extraction & composition	1			
	Pest, Parasites and diseases and their control measures	1			
	Bee economy: Apiculture products and their uses	1			
Practical	**Applied Entomology**	**36**			
	1.Dissection and temporary mounting of Antennae and mouthparts of Cockroach, Housefly and Mosquito	3	1. The Insects: Structure and function: Chapman, R.F. 2. A general Textbook of Entomology: Imms, A.D. 3. Medical Entomology: Hati,A.K.	1.Chalk & Talk method 2. Use of preserved specimens, Charts& microscopes	Dr. Patralekha Mukhopadhyay
	2. Methods of collection, preservation and identification of economically important insects	2	1. Practical Zoology: Ghosh K.C., Manna B. 2.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay S., Das S.K. 3. Practical Zoology: Chatterjee A.K., Chakraborty C. 4. Collection, preservation and identification of insects: Dr. A.K. Ghosh		
	3. Identification of Insect pests	4			
	4. Morphological studies of various castes of *Apis* sp	4	1.A.Sukla: A handbook of economic Zoology, 2.Chaudhuri : Economic Zoology etc.	Photographs and study materials	Dr.Debjani Das Ghosh
	5. Identification of bivoltine and multivoltine mulberry cocoon	4			

	6. Identification and medical significance of insects				
	Aedes sp, *Culex* sp, *Anopheles* sp, *Musca* sp, *Cimex* sp	3	1. Practical Zoology: Ghosh K.C., Manna B. 2.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay S., Das S.K. 3. Practical Zoology: Chatterjee A.K., Chakraborty C. 4.Medical Entomology: Hati,A.K.	1.Chalk & Talk method 2. Use of preserved specimens, permanent slides, Charts & microscopes	Dr. Patralekha Mukhopadhyay
	Phlebotomus sp. (sand fly), *Pediculus humanuscapitis* (head louse), *Xenopsylla* sp.(rat flea)	2	1.Chapman, R.F.(2012). The Insects: Structure and Function, 5th edition, Cambrige University press 2.wikipedia	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
	7.Visits to any one place of applied entomological significance & Submission	14	1.Depending on the visit study materials to be provided 2.Review papers & journals available at Internet and Research Institutes	1.Chalk & Talk method 2.Field visit 3.Use of Computers & LCD projector	Dr. Patralekha Mukhopadhyay/Dr. Debjani Das Ghosh

LESSON PLAN:SEMESTER-I
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: DR. SUMALLYA KARMAKAR, DR. DEBJANI DAS GHOSH, SUCHONA CHAKRABORTY & DR. PATRALEKHA MUKHOPADHYAY

Subject: Zoology Gen. (Minor & MDC)

Paper: Core Course (Cell Biology)-CC1

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments (Concerned Teacher)**
Unit 1 , ,	**Plasma membrane**	**7**	1.The Cell : G.M. Cooper 2.Cell & Molecular Biology : Karp	1. Chalk & Talk method 2.PDF 3.Reference Notes	Suchona Chakraborty
	Lipid Bilayer	1			
	Peripheral & integral protein , Glycoprotein & Glycolipid	1			
	Fluid Mosaic model	1			
	Mobility of Membrane lipid & protein	1			
	Cell –cell junction	1			
	Transport through cell membrane	2			
Unit 2	**Cytoplasmic organelle –I**	**8**			
	•ER – Morphology, Protein targeting, Signal hypothesis, Protein Insertion , folding & export.	3			
	Golgi body - Morphology, Protein glycosylation, sorting & export	2			
	•Vesicular Transport – Cargo selection, Vesicle fusion	2			
	Lysosome –Polymorphism, Endocytosis, Formation	1			
Unit 3	**Cytoplasmic organelles -II**	**5**			Dr. Sumallya Karmakar
	Mitochondria: Structure, Semi-	3	The Cell: Bruce Alberts	1. Chalk & Talk	

	autonomous nature, Mitochondrial DNA, Endosymbiotic hypothesis Mitochondrial Respiratory Chain, Chemiosmotic hypothesis and Oxidative Phosphorylation with reference to ATP Synthase and ATP synthesis			method 2. PPT	
	Peroxisomes: Structure and Functions; **Centrosome** and its organization	2	The Cell: Bruce Alberts	1. Chalk & Talk method 2. PPT	
Unit 4	**Cytoskeleton**	**4**			Dr. Sumallya Karmakar
	Structure and Types: Microtubules, Actin filaments, and Intermediate filaments; Basic composition and function of ECM; Cell matrix Interactions(Integrins	4	The Cell: Bruce Alberts	1. Chalk & Talk method 2. PPT	
Unit 5	**Nucleus**	**5**			Dr. Sumallya Karmakar
	Nuclear envelope, nuclear pore complex (transport not included), Kinetochore and centromeric DNA; Chromatin and levels of its packaging. Euchromatin & Heterochromatin, Position effect variegation. Chromatin remodeling complex.		The Cell: Bruce Alberts	1. Chalk & Talk method 2. PPT	
Unit 6	**Cell cycle**	**11**			Dr. Sumallya Karmakar
	Cell Cycle: Phases of the eukaryotic cell cycle, Protein Kinases and Cell cycle regulation, MPF, Growth factors and regulation of G1-Cdks, S phase and regulation of DNA replication, DNA damage checkpoints	6	Concepts of Genetics: Klugg and Cumings	1. Chalk & Talk method 2. PPT	
	Cell Death: Caspases, Bcl-2 family, Intrinsic (Death receptors) and Extrinsic Pathway (apoptosome);	2	Concepts of Genetics: Klugg and Cumings	1. Chalk & Talk method 2. PPT	Dr. Sumallya Karmakar

	Cancer: Basic Concept of Protooncogene [Ras] & Tumor suppressor genes [Rb and p53] Different ways of activation of a protooncogene to Oncogene.	3	Concepts of Genetics: Klugg and Cumings	1. Chalk & Talk method 2. PPT	Dr. Sumallya Karmakar
Unit 7	**Cell Signalling**	**5**	1. Karp' s Cell and Molecular Biology,, 2. De Robertis Cell and Molecular Biology etc.	1.PPT, 2.Chalk and talk 3. Study materials	Dr. Debjani Das Ghosh
	Signalling system:modes of cell-cell signalling	1			
	Types of signalling molecules	1			
	Signalling receptors: G protein	1			
	Signalling receptors: adenyl cyclase-cAMP	1			
	Signalling receptors:RTK, JAK-STAT	1			
Unit 8	**Tools and techniques in Cell Biology**	**5**			
	Animal Cell Culture: Primary cell culture and Cell line. Subcellular fractionation and Ultracentrifugation	2			Dr. Sumallya Karmakar
	Freeze fracture Replication and Freeze Etching	1			
	Principle of Light Microscope: Bright field, Phase contrast microscope, Fluorescence Microscope with reference to FRET, Principle of SEM & TEM.	1			
	Cryofixation & use of frozen specimen	1	1.The Cell: G.M. Cooper 2.Cell & Molecular Biology: Karp	1. Chalk & Talk method 2.PDF 3.Reference Notes	Suchona Chakraborty

Practical	**Cell Biology lab**	**20**			
	1. Cell viability study by Trypan Blue Exclusion method	3			Dr. Sumallya Karmakar
	2. Standardization of Ocular and Stage Micrometer	4	Modern Approach to Practical Botany: Santra and Maji	1. Chalk & Talk method 2.Use of Compound Microscope, Stage micrometer & Ocular micrometer	Dr. Patralekha Mukhopadhyay
	Measurement of microscopic specimen such as *Paramoecium* sp	6			
	3.Preparation of squamous epithelial cell with staining	4	1. Practical Zoology: Ghosh K.C., Manna B. 2.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay S., Das S.K. 3. Practical Zoology: Chatterjee A.K., Chakraborty C.	Use of Microscope, staining set & instruments	Suchona Chakraborty
	4. Isolation of Bone Marrow Cells from Rat/Mouse and Giemsa Staining	3			Dr. Sumallya Karmakar

LESSON PLAN: SEMESTER-I
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: DR. PATRALEKHA MUKHOPADHYAY, DR. SUCHARITA SAHA, DR. DEBJANI DAS GHOSH

Subject: Zoology Gen. (MDC)

Paper: Skill Enhancement Course (Applied Entomology)-SEC

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit I	**Agricultural Entomology**	**6**	1.Economic Zoology: Shukla & Upadhyay 2. Introduction to Economic Zoology: Sarkar, Kundu, Chaki 3. Elementary Applied Zoology: Debajyoti Chattopadhyay	1.Chalk & Talk method 2.Power Point presentation 3.Use of Charts	Dr. Patralekha Mukhopadhyay
	Concept of insect pest, EIL, ETL	1			
	Life cycle, Nature of damage and control measures of pests of major crops	3			
	Insect Pest Control	2			
Unit II	**Sericulture**	**8**	1.A.Sukla: A handbook of Economic Zoology, 2.Chaki, Kundu and Sarkar: Introduction to economic Zoology, 3.Chaudhuri: Economic Zoology etc.	1.Photographs 2. Chalk and talk 3. Study materials	Dr. Debjani Das Ghosh
	Types of silk moths, geographical distribution, host plants	2			
	Life cycle of *B.mori*, silk gland, composition of silk, uses of silk	2			
	Rearing, extraction, reeling of mulberry silk	2			
	Silkworm diseases, pests and their control	2			

Unit III	**Apiculture**	**7**			
	Various domesticated species of Honey bee	2			
	Social organization and life cycle	1			
	Modern method of bee keeping	1			
	Parasites and diseases and control	2			
	Bee economy	1			
Unit IV	**Vermiculture**	**7**	Lekshmy , M.S. and Santhi, R. Vermitechnology. Saras Publication. ISBN:9789382459323	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
	Scope of vermiculture, habit categories of earthworm, methodolology of vermicomposting, containers for culturing, raw materials required, preparation of bed, environmental pre-requisites, feeding, harvrsting and storage of vermicompost, advantages of vermicomposting, diseases and pests of earthworm				
Unit V	**Aquaculture**	**8**	Pandey, K. and Shukla,J.P. (2013). Fish and Fisheries, Rastogi Publications		
	Aquaculture Principles, definition and scope, prawn culture: penaeid and palaemonid features with examples, semi-intensive method of prawn culture, application of prawn culture, difference between major and minor carps with examples. Composite fish farming: general concepts, advantages				

	and disadvantages, Induced breeding; method and advantages, integrated fish farming				
Unit VI	**Livestock Management**	**8**			Dr. Sumallya Karmakar
Unit VII	**Lac Culture**	**6**			Dr. Sumallya Karmakar
Practical	**Applied zoology**	**20**			
	1. Identification of various castes of honey bee, life cycle stages of *Bombyx mori*	4	1. A.Sukla: A handbook of economic Zoology 2.Chaki, Kundu and Sarkar: Introduction to economic Zoology 3. Chaudhuri: Economic Zoology etc.	Photographs, chalk and talk and study materials	Dr. Debjani Das Ghosh
	Identification of life stages of Kerri lacca				Dr. Sumallya Karmakar
	Identification of earthworms used in vermiculture	**			Dr. Sucharita Saha
	Identification of ectoparasites of Poultry birds				Dr. Sumallya Karmakar
	2. Identification of the following fish and prawn specimens (specimen characters only): *Labeo rohita, Catla catla, Cirrhinus mrigala, Cyprinus carpio, L. bata, Penaeus monodon, Macrobrachium rosenbergi*	4	Ghosh, K.C., Manna, B.-- Practical Zoology, NCBA	1.Chalk and talk 2. Jar specimen display	Dr. Sucharita Saha

	3. Collectionofanytwopestsand submissionofspecimensalong withareport	10	1. Economic Zoology: Shukla & Upadhyay 2. Review papers & journals available at Internet and Research Institutes	1. Chalk & Talk method 2. Power Point presentation 3.Use of Charts, microscopes	Dr. Patralekha Mukhopadhyay
	4.Visittoanyfarmofeconomic importanceandsubmissionofre portonthevisit	12	1.Depending on the visit study materials to be provided 2.Review papers & journals available at Internet and Research Institutes	1.Chalk & Talk method 2.Field visit 3.Use of Computers & LCD projector	Dr. Patralekha Mukhopadhyay/ Dr. Sucharita Saha/ Dr. Debjani Das Ghosh

LESSON PLAN: SEMESTER-I
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: DR. PATRALEKHA MUKHOPADHYAY, DR. SUCHARITA SAHA, DR. DEBJANI DAS GHOSH, DR. SUMALLYA KARMAKAR

Subject: Zoology /IDC

Paper: Interdisciplinary Course (Animal Biology)-IDC-1

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Animal Diversity**	**10**			
	Phylum Characters and examples of Cnidaria, Ctenophora,Mollusca and Echinodermata	5	Chaki, K.C., Kundu, G. and Sarkar, S. (2005). Introduction to General Zoology, New Central Book Agency (P) Ltd. Vol-1, Chapter-1.	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
	Phylum Characters and examples of Platyhelminthes, Nemathelminthes, Annelida, Arthropoda, Chordata	5	1.Introduction to General Zoology: Vol I & II: Sarkar, Kundu, Chaki	1. Chalk & Talk method 2. Use of Charts, preserved specimens	Dr. Patralekha Mukhopadhyay
Unit 2	**Genetics**	**12**			Dr. Sumallya Karmakar
	1. Mendelian Principles and Laws of inheritance	3	Concepts of Genetics: Klugg and Cumings	1.Chalk and talk	
	2. Linkage and Recombination basic Concepts	3			
	3. Sex Determination with reference to Drosophila [only genic balance theory]	3			
	4. Chromosomal Aberration [Structural and Numerical]	3			

Unit 3	**Biodiversity and Wildlife**	**15**			
	1.Biodiversity: Definition, Types and Value 2.Indices (Shannon and Simpson)	8	1.Sharma,P.D. (2001). Ecology and Environment. Rastogi Publications 2.https://www.worldwildlife.org/page	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
	3.Conservation :in-situ and ex-situ	3	1.G.K Saha and S Majumdar:Threatened mammals of India, 2. G.K Saha and S Majumdar:Wildlife Biology, 3.Wilson:Biodiversity, 4.Sidhi and Ehlich: Conservation Biology for all etc	1.Photographs 2. Chalk and talk 3. Study materials	Dr. Debjani Das Ghosh
	4.Conservation priority: Hotspot, Megadiversity, sensitive ecosystem	3			
	5.Indigenous knowledge and PBR:Basic concept	1	https://Byjus.com/free-ias-prep/peoples-biodiversity-register-pbr-upsc-notes/		Dr. Sucharita Saha
Unit 4	**Insect vectors**	**8**			
	1. Concept of vector:Biological and mechanical vectors with examples	2	1.Noble and Noble: Parasitology: The biology of animal parasites 2.Chapman: The insects: structure and function etc.	1.Photographs 2. Chalk and talk 3. Study materials	Dr. Debjani Das Ghosh
	2.Disease cycle & Reservoir Concept	1	1. Medical Entomology: Hati,A.K. 2. Introduction to General Zoology: Vol II: Sarkar, Kundu, Chaki	1. Chalk & Talk method 2. Use of Charts, preserved specimens	Dr. Patralekha Mukhopadhyay
	3.Life cycle, control, role as vector of *Anopheles* and *Aedes*	5			
Unit 5	**Laboratory techniques and**	**5**			

	Instrumentation				
	1.Basics of Light Microscopy	2	Raghava, N. and Rabindra ,P.R. Biophysical methods tools and techniques in Biology, Part-1 Microscopy. Notion Pres	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
	2.Principles and Application of Colorimetry	2	Ghosh and Manna: Practical Zoology	1.Photographs 2. Chalk and talk 3. Study materials	Dr. Debjani Das Ghosh
	3.Principles and Application of Ultracentrifugation	1	Raghava, N. and Rabindra ,P.R. Biophysical methods tools and techniques in Biology	1.Chalk and talk 2. Link share	Dr. Sumallya Karmakar
Practical	**Animal Biology**	**20**			
	1.Karyotype analysis of Klinefelter, Down,Turner, Edward & Patau Syndrome	2	Ghosh K.C., Manna B.	1.Photographs 2. Chalk and talk 3. Study materials	Dr. Sumallya Karmakar
	2.Identification of specimens: *Amoeba, Paramoecium, Taenia,Ascaris, Nereis, Pheretima, Penaeus, Macrobrachium, Musca, Anopheles, Culex*	6	1. Practical Zoology: Ghosh K.C., Manna B. 2.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay S., Das S.K. 3. Practical Zoology: Chatterjee A.K., Chakraborty C.	1. Chalk & Talk method 2. Use of Charts, preserved specimens, permanent slides, microscopes	Dr. Patralekha Mukhopadhyay
	Identification of specimens:*Sycon*, Neptune's cup,*Pila, Lamellidens, Asterias*	6	1. Practical Zoology: Ghosh K.C., Manna B. 2.An advanced Laboratory Manual of Zoology: Poddar T.,	1.Chalk and talk 2. Jar specimen display	Dr. Sucharita Saha

			Mukhopadhyay S., Das S.K.		
	3. Local-Outdoor trip for biodiversity	6	1. Books on Biodiversity 2.Review papers & journals available at Internet 3.Depend on the field trip study materials to be provided	1.Chalk & Talk method 2.Field visit 3.Use of Computers & LCD projector	Dr. Patralekha Mukhopadhyay/ Dr. Sucharita Saha/ Dr. Debjani Das Ghosh

LESSON PLAN: SEMESTER-III

DEPARTMENT: ZOOLOGY

NAME OF FACULTY: DR. PATRALEKHA MUKHOPADHYAY, DR. SUCHARITA SAHA, DR. DEBJANI DAS GHOSH, DR. SUMALLYA KARMAKAR

Subject: Zoology Hons. / ZOOA

Paper: Chordates: CC3-5

Planned				**After Implementation**	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Introduction to Chordates** General characteristics and outline classification of Phylum Chordata	**2**	1.Textbook of Vertebrates: Parker & Haswell 2. Life of Vertebrates by J.Z. Young 3. Introduction to General Zoology: Vol II: Chaki, Kundu, Sarkar	1. Chalk & Talk method 2.Power Point presentation	Dr. Patralekha Mukhopadhyay

Unit 2	**Protochordata**	**7**	Chaki, K.C., Kundu, G. and Sarkar, S. (2005). Introduction to General Zoology, New Central Book Agency (P) Ltd. Vol-2	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
	General characteristics and classification of Sub-phylum Urochordata and Cephalochordata up to classes (Young, 1981), Metamorphosis in *Ascidia*, Chordate features in *Branchiostoma*, Structure of pharynx and feeding in *Branchiostoma*				
Unit 3	**Agnatha**	**2**	Chaki, K.C., Kundu, G. and Sarkar, S. (2005). Introduction to General Zoology, New Central Book Agency (P) Ltd. Vol-2		
	General characteristics and classification of cyclostomes upto order (Young, 1981)				
Unit 4	**Pisces**	**7**	Chaki, K.C., Kundu, G. and Sarkar, S. (2005). Introduction to General Zoology, New Central Book Agency (P) Ltd. Vol-2		
	General characteristics and classification upto living sub-classes (Young, 1981), Accessory respiratory organs, Migration in fishes, Parental care in fishes, Swim bladder in fishes				
Unit 5	**Amphibia**	**7**	1.Textbook of Vertebrates: Parker & Haswell 2. Life of Vertebrates by J.Z. Young 3. Introduction to General Zoology: Vol II : Chaki, Kundu, Sarkar 4. Biology of animals, Vol II: Sinha, Adhikari &	1.Chalk & Talk method 2. Power Point presentation	Dr. Patralekha Mukhopadhyay
	General characteristics and classification up to living Orders	2			
	Metamorphosis	2			
	Paedomorphosis	2			
	Parental care in Amphibia	1			
Unit 6	**Reptilia**	**8**			
	General characteristics and classification up to living	3			

	Orders		Ganguly 5. Comparative anatomy of vertebrates: Kent G.C., Carr R.K.		
	Poison apparatus and Biting mechanism in snake	3			
	Poisonous and non-poisonous snakes	2			
Unit 7	**Aves**	**8**			
	General characteristics and classification up to living Sub classes	1			
	Exoskeleton in birds	3			
	Migration in birds	2			
	Principles & aerodynamics of flight	2			
Unit 8	**Mammals**	**9**			Dr. Sumallya Karmakar
	General characters and classification up to living sub classes (Young, 1981)	2	1. Life of Vertebrates by J.Z. Young 2. Comparative anatomy of vertebrates: Kent G.C., Carr R.K.	1.Chalk & Talk method 2. Power Point presentation	
	Exoskeleton derivatives of mammals	3			
	Adaptive radiation in mammals with reference to locomotory appendages	2			
	Echolocation in Micro chiropterans	2			
Practical	**Chordata Lab**	**60**			
	a)Protochordata : *Balanoglossus, Branchiostoma*	2	Ghosh, K.C. and , Manna, B.--Practical Zoology **(NCBA)**	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
	b)Agnatha : *Petromyzon*	2			
	c)Fishes : *Scoliodon, Sphyrna, Pristis, Torpedo, Mystus,*	5			

	Heteropneustes, Labeo rohita, Exocoetus, Hippocampus, Anabas, Flat fish				
	d) Identification of amphibians: *Necturus, Bufo, Rana, Tylototriton,* Axolotl larva	3	1. Practical Zoology: Ghosh K.C., Manna B. 2.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay S., Das S.K. 3. Practical Zoology: Chatterjee A.K., Chakraborty C.	1.Chalk & Talk method 2. Use of charts, preserved specimens	Dr. Patralekha Mukhopadhyay
	e)Identification of reptiles: *Chelone, Trionyx, Hemidactylus, Varanus,Calotes, Chamaeleon, Draco,Vipera, Naja, Hydrophis*	6			
	f)Identification of mammals: Bat, *Funambulus*	2			
	Dissection of brain and pituitary	6	1. Practical Zoology: Ghosh K.C., Manna B. 2.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay S., Das S.K. 3. Practical Zoology: Chatterjee A.K., Chakraborty C.	1.Chalk & Talk method 2. Use of charts, live specimens	Suchona Chakraborty
	Pecten from fowl head	4	1.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay	1. Use of live specimen 2. Microscopes	Dr. Patralekha Mukhopadhyay
	Power point presentation on study of habit, habitat or behaviour of any one animal by students	30	Review papers & journals available at Internet	Power Point presentation by students	Dr. Patralekha Mukhopadhyay, Dr. Sucharita Saha and Dr. Debjani Das Ghosh

LESSON PLAN: SEMESTER-III
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: DR. SUCHARITA SAHA, DR. DEBJANI DAS GHOSH & DR. PATRALEKHA MUKHOPADHYAY

Subject: Zoology Hons. / ZOOA

Paper: Animal Physiology: CC3-6

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Tissues** Structure, location, classification and functions of Epithelial tissue, Connective tissue, Muscular tissue and Nervous tissue	**4**	1.Human Physiology: C.C. Chatterjee	1. Chalk & Talk method 2.Power Point presentation 3. Charts	Dr. Patralekha Mukhopadhyay
Unit 2	**Bone and Cartilage** Structure and types of bones and cartilages,Ossification	**4**			
Unit 3	**Nervous System** Structure of neuron, Resting membrane potential, Origin of action potential Propagation of action potential across myelinated and non-myelinated nerve fibres, Types of synapses, Synaptic transmission and neuromuscular junction	**10**	1.Guyton, A.C. and Hall, J.E. (2011). textbook of Medical Physiology. XII Edition, Saunders Company 2.Gannong, W.F.(1977).Review of medical physiology , 8th edition, maruzen asian edition	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
Unit 4	**Muscular System**	**10**			Dr. Sumallya Karmakar
	Histology of different types of muscle	3	Ganong's Review of Medical Physiology; McGraw Hill	1.Chalk and talk 2. Link share	
	Ultra-structure of skeletal	4			

	muscle Molecular and chemical basis of muscle contraction				
	Characteristics of muscle fibre	3			
Unit 5	**Reproductive System**	**5**			
	Histology of mammalian testis and ovary	2	1. Fox et al: Endocrinology 2. Strauses and Barbieri: Yen and Jeffe's Reproductive endocrinology	1. PPT 2. Chalk and Talk	Dr. Debjani Das Ghosh
	Physiology of mammalian reproduction- menstrual cycle	1			
	PEER TEACHING	1			
	Physiology of mammalian reproduction- oestrus cycle	1			
Unit 6	**Endocrine System**	**16**	1.Gardnander Shoback: Greenspan's basic and clinical endocrinology 2.Norris: Vertebrate endocrinology, 3.Fox et al: Endocrinology etc.		
	Histology and function of thyroid, pancreas and adrenal	3			
	Function of pituitary	2			
	Classification of hormones	2			
	Mechanism of hormone action Signal transduction pathways for steroidal and non steroidal hormones	5			
	PEER TEACHING	1			
	Hypothalamus-principal nuclei involved in neuroendocrine control of anterior pituitary	2			
	Placental hormones	1			
Practical	**Animal Physiology**	**60**			
	1. Recording of cardiac and simple muscle twitch with electrical stimulation	10	Ghosh and Manna:Practical Zoology etc.		Dr. Sumallya Karmakar
	2. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve	10		Microscope, slides and study materials	Dr. Sumallya Karmakar

	cells				
	3. STUDY OF PERMANENT SLIDES OF:- MAMMALIAN SKIN, SPINAL CORD, PANCREAS, TESTIS, OVARY, ADRENAL, LUNG, PYLORIC, CARDIAC STOMACH, THYROID, SMALL INTESTINE, LARGE INTESTINE OF MAMMAL(WHITE RAT)	20	Ghosh and Manna:Practical Zoology etc.	Microscope, slides and study materials	Dr. Debjani Das Ghosh
	4.MICROTOMY: PREPARATION OF PERMANENT SLIDE OF ANY FIVE TISSUES	20			

LESSON PLAN:SEMESTER-III
DEPARTMENT: ZOOLOGY
NAME OF FACULTY:DR. DEBJANI DAS GHOSH, SUCHONA CHAKRABORTY & DR. SUMALLYA KARMAKAR

Subject: Zoology Hons. / ZOOA

Paper: Fundamentals of Biochemistry: CC3-7

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Carbohydrates**	**8**	1)Biochemistry: D. Das 2) Principles of Biochemistry: Lehninger 3) Illustrated Biochemistry: Harper	1.Chalk & Talk method 2.PDF 3.Reference Notes	Suchona Chakraborty
	Structure	2			
	Biological Importance of mono, di & polysaccharide	2			
	Derivatives of monosaccharide	1			
	Glycolysis, Citric acid cycle, Pentose phosphate pathway,	2			
	Gluconeogenesis	1			
Unit 2	**Lipids**	**7**			
	Structure, Physiological importance	2			
	Saturatred & unsaturated fattyacid	1			
	Phospholipid, Glycolipid, Steroid	1			
	Eicosanoid, Terpinoid,	1			
	Beta-oxidation,	1			
	Biosynthesis	1			

Unit 3	**Proteins**	**10**			
	Structure	1			
	Classification,	1			
	Properties	2			
	Importance	1			
	Essential & Non-essential aminoacid	1			
	Protein bonds, Transamination, Deamination, Urea-cycle	3			
	Glucogenic &ketogenic aminoacid	1			
Unit 4	**Nucleic Acids**	**10**			Dr. Sumallya Karmakar
	Structure of Purines, Pyrimidines, Nucleosides and Nucleotides;	5	The Cell: Brure Alberts	1. PPT 2. Chalk and Talk	
	Nucleic Acid Metabolism: Catabolism of adenosine, Guanosine, cytosine and thymine.	5	The Cell: Brure Alberts	1. PPT 2. Chalk and Talk	
Unit 5	**Enzymes**	**13**			
	Nomenclature and Classification	1	1. D. Das: Fundamentals of Biochemistry 2. Harper's illustrated biochemistry etc.	1. PPT 2. Chalk and Talk 3. PDF	Dr. Debjani Das Ghosh
	Cofactors, Specificity of enzyme action,Isozymes	1			
	Mechanism of enzyme action , Enzyme kinetics	3			
	Derivation of Michaelis-Menten equation, Lineweaver-Burk plot	4			
	Factors affecting rate of enzyme-catalysed reactions	1			

	Enzyme inhibition	1			
	Peer Teaching	1			
	Class test	1			
Unit 6	**Oxidative phosphorylation**	**2**	1)Biochemistry: D. Das 2) Principles of Biochemistry: Lehninger 3) Illustrated Biochemistry: Harper	1.Chalk & Talk method 2.PDF 3.Reference Notes	Suchona Chakraborty
	Mitochondrial respiratory chain	1			
	Inhibitors & un-couplers	1			
Practical	**Fundamentals of Biochemistry**	**60**			
	1.Qualitative test Carbohydrates, Proteins and Lipids	20	1. Practical Zoology: Ghosh K.C., Manna B. 2.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay S., Das S.K. 3. Practical Zoology: Chatterjee A.K., Chakraborty C.	Chemicals & lab apparatus	Suchona Chakraborty
	2.Qualitative estimation Urea & Uric acid	12			
	Uric acid	3			
	3. Paper chromatography	10	Web based material	Chemicals & lab apparatus	Dr. Sumallya Karmakar
	4. Quantitative estimation of water soluble proteins by Lowry Method	15	ABSORPTIOMETRY AND“COLORIMETRIC ANALYSIS” : H.N.Wison	1.Hands on Experiment 2. Study materials	Dr. Debjani Das Ghosh

LESSON PLAN: SEMESTER-III
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: DR. PATRALEKHA MUKHOPADHYAY, DR. SUCHARITA SAHA, DR. DEBJANI DAS GHOSH ,SUCHONA CHAKRABORTY & DR. SUMALLYA KARMAKAR

Subject: Zoology Hons. / ZOOA

Paper: Apiculture: SEC(A)-1

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Biology of Bees**	**4**	1. Economic Zoology: Shukla & Upadhyay 2. Introduction to Economic Zoology: Sarkar, Kundu, Chaki 3. Elementary Applied Zoology: Debajyoti Chattopadhyay	1.Chalk & Talk method 2.Power Point presentation	Dr. Patralekha Mukhopadhyay
	Apis and Non-*Apis* Bee species and their identification	1			
	General Morphology of *Apis* Honeybees	1			
	Social organization of Bee colony	2			
Unit 2	**Rearing of Bees**	**14**	Datta, M. (2001) Madhu, mom , moumachhi, Paschimbanga Rajya Pustak Porshod	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
	1.Artificial bee rearing, Apiary, Bee hives—Newton and Langstroth box 2.Bee pasturage 3.Selection of bee species for Apiculture 4.Bee keeping equipments 5. Methods of extraction of honey—Indegenous and modern				
Unit 3	**Diseases and Enemies**	**6**	1.Chaudhury: Economic Zoology, 2.Chaki, Kundu ,Sarkar:	1. Photographs 2. Study materials	Dr. Debjani Das Ghosh
	Bee diseases	3			

	Enemies control and preventive measures	3	Economic Zoology etc.		
Unit 4	**Bee Economy** Products of Apiciulture industry & its use	**2**	1. Economic Zoology: Shukla & Upadhyay 2. Introduction to Economic Zoology: Sarkar, Kundu, Chaki 3. Elementary Applied Zoology: Debajyoti Chattopadhyay	1.Chalk & Talk method 2.Reference Notes	Suchona Chakraborty
Unit 5	**Entrepreneurship in apiculture**	**6**			Dr. Sumallya Karmakar
	Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens	6	1. Economic Zoology: Shukla & Upadhyay	1.Chalk & Talk method	

LESSON PLAN: SEMESTER-III
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: SUCHONA CHAKRABORTY, DR. SUCHARITA SAHA, & DR. DEBJANI DAS GHOSH

Subject: Zoology General/ ZOOG

Paper: Physiology and Biochemistry: CC3/GE3

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Nerve and Muscle**	**8**	1.Modern approach to text book of Zoology.. by Chatterjee, Chakraborty	1.Chalk & talk method 2.Reference Notes	Suchona Chakraborty
	Structure of neuron	2			
	Resting & action potential	2			
	Ultra structure of skeletal muscle	2			
	Molecular & chemical basis of muscle contraction	2			
Unit 2	**Digestion**	**6**			
	Physiology of digestion	3			
	Absorption of carbohydrate , protein & lipid	3			
Unit 3	**Respiration**	**6**			
	Pulmonary ventilation	3			
	Transport of O_2 & CO_2	3			
Unit 4	**Cardio-vascular system**	**6**			
	Composition of blood				

		1			
	Structure of heart	1			
	Origin & conduction of cardiac impulse	2			
	Cardiac cycle	2			
Unit 5	**Excretion**	**6**			
	Structure of nephron	1			
	Mechanism of urine formation	2			
	Counter – current mechanism	3			
Unit 6	**Reproduction & endocrine system**	**10**			
	Physiology of male reproductive system	1			
	Histology of testis	1			
	Hormonal control of spermatogenesis	1			
	Physiology of female reproductive system	1			
	Histology of ovary	1			
	Hormonal control of menstrual cycle	1			
	Structure & function of pituitary, thyroid, pancreas, adrenal	4			
Unit 7	**Carbohydrate metabolism**	**4**			
	Glycolysis	1			
	Kreb's cycle	1			
	Glycogenesis	1			
	Electron Transport Chain	1			
Unit 8	**Lipid metabolism**	**4**			
	Beta – oxidation				

		4			
Unit 9	**Protein metabolism**				
	Transamination Deamination Urea cycle	4			
Unit 10	**Enzyme**	**2**			
	Classification, Factors affecting enzyme action	1			
	Inhibition	1			
Practical	**Physiology and Biochemistry Lab**	**60**			
	1. Study of permanent histological sections of pancreas, adrenal and duodenum	20	1.Poddar, T., Mukhopadhyay, S. and Das, S.K. An Advanced Laboratory Mannual of Zoology (Trinity Press) 2. Ghosh & Manna: Practical Zoology	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
	2. Study of permanent histological sections of pituitary, thyroid, liver, lung and kidney	20	Ghosh & Manna: Practical Zoology	1. Microscopes 2. Study materials	Dr. Debjani Das Ghosh
	3. Qualititative test for carbohydrate samples	20	1.Poddar, T., Mukhopadhyay, S. and Das, S.K. An Advanced Laboratory Mannual of Zoology (Trinity Press) 2. Ghosh & Manna: Practical Zoology	1. Chalk & talk method 2. Biochemical equipments & materials	Suchona Chakraborty

LESSON PLAN:SEMESTER-III
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: SUCHONA CHAKRABORTY & DR. SUMALLYA KARMAKAR

Subject: Zoology General/ ZOOG

Paper: Apiculture: SEC-A-3-1

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Biology of bees**	**2**	Economic Zoology by Maity, Dasgupta , Midya	1.Chalk & Talk method 2. Reference Notes	Suchona Chakraborty
	Classification & Biology	1			
	Social organization of be colony	1			
Unit 2	**Rearing of bees**	**14**			
	Artificial bee rearing	6			
	Bee pasturage	2			
	Selection of Bee species for Apiculture	1			
	Bee keeping equipment	2			
	Method of honey extraction	3			
Unit 3	**Diseases & enemies**	**6**			
	Bee diseases & enemies	3			
	Control & prevention	3			
Unit 4	Bee economy	2			

	Products of apiculture industry & their uses	2			
Unit 5	**Entrepreneurship in Apiculture**	**6**			Dr. Sumallya Karmakar
	Bee Keeping Industry - Recent Efforts, Modern Methods in employing artificial Beehives for cross	6	Economic Zoology by Maity, Dasgupta , Midya	1.Chalk & Talk method	

LESSON PLAN:SEMESTER-V

DEPARTMENT: ZOOLOGY

NAME OF FACULTY: DR. SUCHARITA SAHA ,DR. PATRALEKHA MUKHOPADHYAY & DR. DEBJANI DAS GHOSH

Subject: Zoology Hons. / ZOOA

Paper: Ecology: CC-5-11

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Introduction to Ecology** Levels of organization Laws of limiting factors; physical and chemical factors (density-independent factors), biological factors (density-dependent factors) Study of physical factors The Biosphere	**4**	1.Sharma,P.D. (2001). Ecology and Environment.Rastogi Publications 2.Dash, M.C. (1994). Fundamentals of Ecology.Tata McGraw-Hill Publishing Company Ltd. 3.Begon, M., Herper, J.L., Townsend, C.R. (2006). Ecology: Individuals, Populations & Communities, 4th ed, Blackwell Sc. 4.Ricklefs, R.E., Miller, G.L. (2000). Ecology. 4th Ed. W.H. Freeman and Co.	1.Chalk and talk 2. Link share	Dr. Sucharita Saha
Unit 2	**Population** Unitary and modular populations Unique and group attributes of population: Demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion. Population growth patterns and equations : Geometric, exponential and logistic growth	**20**			

	r- and K- strategies Population regulation : Density-independent and dependent factors Population interactions: Gause's principle with laboratory and field examples. Lotka-Volterra equation for competition.				
Unit 3	**Community** Community characteristics: Quantitative characters like species diversity, species richness, abundance, dominance; qualitative characters like Vertical stratification, ecotone, edge effect, ecological succession (with one example)	**11**			
Unit 4	**Ecosystem** Types of ecosystem with an example in detail Food-chain : Definition and types-detritus and grazing food-chain, Linear and Y-shaped food-chains Food-web: Definition and types Energy flow: Models of energy flow Ecological pyramids: definition, Types with examples Ecological efficiencies Nitrogen cycle	**8**			
Unit 5	**Applied Ecology** Types and levels of Biodiversity	**7**			

	Megadiversity countries and biodiversity hot-spots Flagship and keystone species species Wild-life conservation (in-situ and ex-situ) Concept of protected areas : National parks, Sanctuaries, Biosphere resrves Red data book, Indian Wildlife Act and Schedules Concept of corridor: Advantages and problems Threats to survival and conservation strategies for Tiger, Olive ridley and white rumped Vulture				
Practical	**Ecology Lab**	**60**			
	a)Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shanon-Weiner diversity index for the same community	20	Roy, M. (2018). Perspectives in Ecology,Kalyani Printings, ISBN: 978-93-272-9087-5	Chalk and talk, Specimen and instrument display and use	Dr. Sucharita Saha
	b) Study of an aquatic ecosystem**:** Phytoplanktons and Zooplanktons, measurement of area, temperature, salinity, pH, Dissolved Oxygen content (Winkler's method), and free Carbon-di-oxide	20			
	3.Report on a visit to National park/Biodiversity park/ wildlife	20	1.The book of Indian Birds: Salim Ali	1.Chalk & Talk method	Dr. Patralekha Mukhopadhyay/Dr.

	sanctuary/ any place of ecological interest/ ecological uniqueness /Zoological garden		2.Pocket guide to the Birds of the Indian subcontinent: Grimmett, Inskipp 3. Threatened mammals of India: Goutam Saha 4.Review papers & journals available at Internet	2.Power Point presentation 3. Use of LCD projector & Computers 4. Depending on the visit, study materials are provided	Debjani Das Ghosh

DEPARTMENT: ZOOLOGY

NAME OF FACULTY: DR. SUMALLYA KARMAKAR

Subject: Zoology Hons. / ZOOA

Paper : Principles of Genetics: CC5-12

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Mendelian Genetics and its Extension**	**12**	1. Concepts of Genetics: Klugg and Cumings 2. i-Genetics: Russel	1.Chalk & Talk method 2.Power Point presentation	
	Principles of inheritance, Incomplete dominance and co-dominance, Epistasis, Multiple alleles, Isoallele (White eye mutations), Pseudoallele (Lozenge Locus) & Cis-trans test for allelism, Lethal alleles, Pleiotropy, Penetrance & Expressivity	12			
Unit 2	**Linkage, Crossing Over and Linkage Mapping**	**8**			
	Linkage and Crossing, Complete & Incomplete Linkage, Measuring Recombination frequency and linkage map construction using three factor crosses, Interference and coincidence	4			

	Sex linkage in *Drosophila* (White eye locus) & Human (Haemophilia).	4			
Unit 3	**Mutations**	**12**			
	Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example from *Drosophila* and Human of each), variation in chromosome number;	2			
	Nondisjunction of X chromosome in *Drosophila*	2			
	Non-disjunction of Human Chromosome 21.	2			
	Molecular basis of mutations in relation to UV light and chemical mutagens.	2			
	Mutation detection in *Drosophila* by attached X method.	2			
	Biochemical mutation detection in *Neurospora.*	2			
Unit 4	**Sex Determination**	**8**			
	Mechanisms of sex determination in *Drosophila* and in man	4			
	Dosage compensation in *Drosophila* & Human	4			
Unit 5	**Extra-chromosomal Inheritance**	**2**			
	Kappa particle in *Paramoecium*, Shell spiralling in snail	2			
Unit 6	**Genetic Fine Structure**	**2**			
	Complementation test in Bacteriophage (Benzer's experiment on rII locus)	2			
Unit 7	**Transposable Genetic Elements**	**6**			

	IS element in bacteria, Ac-Ds elements in maize and P elements in *Drosophila*, LINE, SINE, Alu elements in humans	6			
Practical	**Principles of Genetics Lab**	**30**			
	1. Chi-square analyses for genetic ratio test	10			
	2. Identification of chromosomal aberration in *Drosophila* and man from photograph	10		1.Chalk & Talk method 2.Photographs	
	3. Pedigree analysis of some inherited traits in animals	10			

LESSON PLAN: SEMESTER-V
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: DR. DEBJANI DAS GHOSH

Subject: Zoology Hons. / ZOOA
Paper: Parasitology: DSE (A)-5-1

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**INTRODUCTION TO PARASITOLOGY**	**2**	1.Bogitsch et al:Human parasitology, 2.Gunn and Pitt:Parasitology, 3.Dailey: Meyer,Olsen and Schmidt 's essentials of parasitology etc.	1.PPT 2. Study materials	Dr. Debjani Das Ghosh
	a. Brief introduction of parasitism, Parasite, Parasitoid and vector	1			
	b. Host parasite relationship	1			
Unit 2	**PARASITIC PROTISTS**	**12**	Gunn and Pitt: Parasitology etc.		
	Study of Giardia intestinalis	4			
	Study of Trypanosoma gambiense	4			
	Study of Leishmania donovani	4			
Unit 3	**PARASITC PLATYHELMINTHES**	**12**	1.Bogitsch et al:Human parasitology, 2.Gunn and Pitt:Parasitology, 3.Dailey: Meyer,Olsen and Schmidt 's essentials of parasitology etc.		
	a. Study of Schistosoma haematobium	6			
	Study of Taenia solium	6			
Unit 4	**PARASITIC NEMATODES**	**12**	1.Bogitsch et al:Human parasitology, 2.Gunn and Pitt:Parasitology, 3.Dailey: Meyer,Olsen and Schmidt 's		
	a. Study of Ascaris lumbricoides	3			
	b. Study of Ancylostoma duodenale	3			

	c. Study of Wuchereria bancrofti	3	essentials of parasitology etc.		
	d. Nematode plant interaction	3	1. K. D. Chatterjee: Parasitology		
Unit 5	**PARASITIC ARTHROPODS**	**9**			
	a. Biology, importance and control of ticks mites, live, flea, bug	8			
	b. Parasitoid	**1**			
Unit 6	**PARASITIC VERTEBRATES**	**2**			
	a. Cookiecutter shark,Hood mocking bird	1	1. K. D. Chatterjee: Parasitology 2.P. Chakraborty:Textbook of medical parasitology etc.		
Practical	**Parasitilogy lab**	**60**			
	1.STUDY OF LIFE STAGES OF PARASITIC PROTISTS	5	1. Ghosh and Manna: Practical Zoology 2.Chatterjee and Chakraborty: Practical Zoology etc.	1.Photographs 2. Slides 3.Study materials	Dr. Debjani Das Ghosh
	2.STUDY OF ADULT AND LIFE STAGES PARASITIC PLATYHELMINTHES	5			
	STUDY OF ADULT AND LIFE STAGES PARASITIC NEMATODES	5			
	4. STUDY OF MONOGENEA FROM THE GILLS OF FRESH/MARINE FISH	5		1. Hands on Experiment, 2. Study materials	
	5. STUDY OF NEMATODE/CESTODE PARASITE FROM THE INTESTINE OF POULTRY BIRD	5		1.Photographs, 2. Slides 3.Study materials	
	6.SUBMISSION OF A BRIEF REPORT ON PARASITIC VERTEBRATES	35	Based on the report prepared by each student, framework and guidance is given for reportpreparation		

LESSON PLAN: SEMESTER-V
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: DR. PATRALEKHA MUKHOPADHYAY & SUCHONA CHAKRABORTY

Subject: Zoology Hons. / ZOOA

Paper: Endocrinology: DSE (B)-5-1

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Introduction to Endocrinilogy**	**6**	1.Endocrinology .. by Hadley & Levine 2.General Zoology by Chaki, Kundu , Sarkar	1Chalk & Talk Method 2.PDF 3.Reference Notes	Suchona Chakraborty
	Introduction to Endocrinology Classification of hormones	2			
	Characteristic of hormones	1			
	Transport of hormones	1			
	Neurosecretion & neurohormones	2			
Unit 2	**Hypothalamus – hypophyseal axis**	**12**			
	Structure & function of hypothalamus and hypothalamic nuclei	2			
	Regulation of neuroendocrine glands	1			
	Feedback mechanism	1			
	Hypothalamo – Hypophyseal gonadal axis	1			
	Structure of pituitary gland	2			
	Hormones of Pituitary gland and their functions	3			

	Hypothalamo –hypophyseal portal system	2			
Unit 3	**Peripheral Endocrine glands**	**12**	1.Introduction to General Zoology: Vol II: Chaki, Kundu, Sarkar 2.Vertebrate Endocrinology: David O. Norris 3. Ganong's Review of Medical Physiology	1.Chalk & Talk method 2.Power Point presentation	Dr. Patralekha Mukhopadhyay
	Structure, hormones and functions of thyroid, parathyroid, adrenal, pancreas, ovary and testis	8			
	Disorders of endocrine glands (Diabetes mellitus type I & type II; Grave's disease)	4			
Unit 4	**Regulation of Hormone Action**	**12**	1.Endocrinology .. by Hadley & Levine 2.General Zoology by Chaki, Kundu , Sarkar	1.Chalk & talk method 2.PDF 3.Reference Notes	Suchona Chakraborty
	Regulation of hormone action Mechanism of steroidal & nonsteroidal hormones action	3			
	Homeostasis in mammals Calcium	2			
	Glucose	2			
	Bioassay of hormones RIA & ELISA	2			
	Estrous cycle and menstrual cycle in human	3	1.Introduction to General Zoology: Vol II: Chaki, Kundu, Sarkar	1.Chalk & Talk method 2. Power Point presentation	Dr. Patralekha Mukhopadhyay
Unit 5	**Non mammalian vertebrate hormone**	**8**	1.Introduction to General Zoology: Vol II: Chaki, Kundu, Sarkar 2.Vertebrate Endocrinology: David O. Norris 3. Ganong's Review of Medical Physiology	1.Chalk & Talk method 2. Power Point presentation	Dr. Patralekha Mukhopadhyay
	Functions of Prolactin in fishes, amphibians & birds	4			
	Function of Melanotropin in teleost fishes, amphibians and reptiles	4			
Practical	**Endocrinology Lab**	**60**			
	1.Dissect & display of endocrine glands of rat	10	1. Practical Zoology: Ghosh K.C., Manna B.	1.Chalk & Talk method	Suchona Chakraborty

	2.Study of permanent slides of all endocrine glands	20	2.An advanced Laboratory Manual of Zoology: Poddar T., Mukhopadhyay S., Das S.K. 3. Practical Zoology: Chatterjee A.K., Chakraborty C.	2. Use of permanent histological slides, microscopes	Dr. Patralekha Mukhopadhyay
	3.Tissue fixation, embedding, microtomy and slide preparation of endocrine glands	30			Dr. Patralekha Mukhopadhyay&Suchona Chakraborty

LESSON PLAN: SEMESTER-V
DEPARTMENT: ZOOLOGY
NAME OF FACULTY: DR. PATRALEKHA MUKHOPADHYAY, DR. SUCHARITA SAHA, SUCHONA CHAKRABORTY & DR. SUMALLYA KARMAKAR

Subject: Zoology Gen. / ZOOG

Paper: Aquatic Biology: DSE (A)-5-2

Planned				After Implementation	
Unit / Group / Module / Article	**Topics**	**No of Lecture Planned**	**Reference Books**	**Content Delivery Technique**	**Remarks / Comments**
Unit 1	**Aquatic Bionics**	**15**	1.Modern Approach to a text-book of Zoology: Chatterjee, Chakrabarti, Ghosh 2.Ecology and Environment: P.D. Sharma	1.Chalk & Talk method 2. Power Point presentation	Dr. Patralekha Mukhopadhyay
	Brief introduction of the aquatic biomes	2			
	Freshwater ecosystem:lakes, wetlands,streams and rivers	5			
	Estuaries, intertidal zones	3			
	oceanic pelagic zone, marine benthic zone and coral reefs	5			
Unit 2	**Freshwater Biology lakes**	**15**	Jhingran, V.G.(2007). Hindustan Publishing Corporation, 3rd Edition	1.Chalk and talk, 2.Specimen and instrument display and use	Dr. Sucharita Saha
	Origin and classification, Lake as an ecosystem, lake"s morphometry, Physico-chemical characteristics: light, temperature, thermal stratification, Dissolved solids, carbonate, bicarbonates, phosphates and nitrates, turbidity; dissolved gases, oxygen, carbon-di-oxide. Nutrient-cycles in lakes--Nitrogen, Sulphur and Phosphorus.				
	Streams: Different stages of stream development, Physico-chemical				

	environment, Adaptation of hill-stream fishes				
Unit 3	**Marine Biology**	**15**	1.Modern Approach to a text-book of Zoology: Chatterjee, Chakrabarti, Ghosh 2.Ecology and Environment: P.D. Sharma	1.Chalk & Talk method 2. Reference Notes	Suchona Chakraborty
	Marine Biology Salinity & density	3			
	Continental shelf	3			
	Deep sea adaptation	3			
	Coral reefs	3			
	Sea weeds	3			
Unit 4	**Management of Aquatic Resources**	**15**			Dr. Sumallya Karmakar
	Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation ;legislations,	10	1.Modern Approach to a text-book of Zoology: Chatterjee, Chakrabarti, Ghosh 2.Ecology and Environment: P.D. Sharma 1.Chalk & Talk method 2. Reference Notes		
	Sewage treatment Water quality assessment - BOD and COD	5			
Practical	**Aquatic Biology**	**60**			Dr. Sucharita Saha