

TEACHING PLAN (Year 2021-22)

Department of Zoology

SBMS COLLEGE, SUALKUCHI

Teaching technique:

- The classroom transaction of all the papers will be done through lectures, assignments, group discussion, practical demonstration, projects, etc.
- To make the teaching learning process more interactive and interesting ICT enabled classes will also be taken.
- In view of the pandemic situation, few classes will be arranged through online mode also.
- Practical experiments will be done in departmental laboratories under guidance of respective teacher. Necessary instruction will be followed. To develop an understanding quality few experiments will be incorporated outside the laboratory (within college campus)
- To gain practical knowledge, field study, educational excursion, institutional visit etc. will also be planned according to demand of course content.
- At least two class tests will be conducted per semester among the major students.
- For knowledge upliftment, observation of Days of importance, poster presentation competition, photography (Zoology related) competition will also be organized time to time.
- Invited lecture/ popular talk/ workshop/ departmental seminars etc. will also be arranged for boosting the knowledge/ ideas among the students.

NB:

- Sessional Examinations are conducted by the College Examination Cell in the middle part of each semester.
- End Semester Examinations are generally held in Nov- Dec and May- Jun.
- Summer Vacation (generally starts from 1st Jul to 31st Jul)
- Winter Break (generally starts 1st Jan to 19th Jan)

CBCS Course Content

Odd Semester

Semester	TDC I Semester	Course	Major
Credit	04	Marks:	60
Paper Name	NON-CHORDATES I: PROTISTS TO PSEUDOCOELOMATES	Paper Code:	ZOO-HC-1016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> • Protista, Parazoa and Metazoa General characteristics and Classification upto classes Study of Euglena, Amoeba and Paramecium Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica Locomotion and Reproduction in Protista Evolution of symmetry and segmentation of Metazoa 	Dr Sikha Rani Kalita	13	Sep	
2	<ul style="list-style-type: none"> • Porifera General characteristics and Classification upto classes Canal system and spicules in sponges 		04	Sep	
3	<ul style="list-style-type: none"> • Cnidaria: General characteristics and Classification upto classes Metagenesis in Obelia Polymorphism in Cnidaria Corals and coral reefs 		09	Oct	
4	<ul style="list-style-type: none"> • Ctenophora: General characteristics and Evolutionary significance 		02	Nov	
5	<ul style="list-style-type: none"> • Platyhelminthes: General characteristics and Classification up to classes Life cycle and pathogenicity of Fasciola hepatica and Taeniasolium 	Dr Kakali Talukdar	06	Sep	
6	<ul style="list-style-type: none"> • Nematelminthes: General characteristics and Classification up to classes Lifecycle, and pathogenicity of Ascaris lumbricoides and Wuchereri abancrofti Parasitic adaptations in helminthe 		06	Nov	

Semester	TDC I Semester	Course	Major
Credit	04	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-1016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Study of whole mount of Euglena, Amoeba and Paramecium, Binary fission and Conjugation in Paramecium	Dr Sikha Rani Kalita	02	Sep	
2	• Examination of pond water collected from different places for diversity in protista		07	Sep	
3	• Study of Sycon (T.S. and L.S.), Hyalonema, Euplectella, Spongilla		04	Oct	
4	• Study of Obelia, Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia, Metridium, Pennatula, Fungia, Meandrina, Madrepora		07	Nov	
5	• One specimen/slide of any ctenophore	Dr Kakali Talukdar	02	Sep	
6	Study of adult Fasciola hepatica, Taenia solium and their life cycles (Slides/micro- photographs)		04	Nov	
7	• Study of adult Ascaris lumbricoides and its life stages (Slides/micro-photographs)		04	Nov	
8	• To submit a Project Report on any related topic on life cycles.	Bandana Deka	Each student will be given to prepare a project report individually on a topic given in the syllabus (within Nov)		

Semester	TDC I Semester	Course	Major
Credit	04	Marks:	60
Paper Name	PRINCIPLES OF ECOLOGY	Paper No:	ZOO-HC-1026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Introduction to Ecology: History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of physical factors	Bandana Deka	05	Sep	
2	• Population: Unitary and Modular populations Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion Exponential and logistic growth, equation and patterns, r and K strategies Population regulation - density-dependent and independent factors Population interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition and Predation, functional and numerical responses		12	Sep	
3	• Community: Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Ecotone and edge effect; Ecological succession with one example Theories pertaining to climax community		08	Oct, Nov	
4	• Ecosystem: Types of ecosystems with one example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies Nutrient and biogeochemical cycle with one example of Nitrogen cycle Human modified ecosystem	Dr Kakali Talukdar	10	Oct	
5	• Applied Ecology: Ecology in Wildlife Conservation and Management		04	Oct	

Semester	TDC I Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-1026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided	Bandana Deka	02	Nov	
2	• Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon Weiner diversity index for the same community		04	Nov	
3	• Study of an aquatic ecosystem: Phytoplankton and zooplankton, determination of pH	Dr Sikha Rani Kalita	04	Nov	
	• Measurement of area, temperature, turbidity/penetration of light,	Bandana Deka	04	Nov	
	• Dissolved Oxygen content (Winkler's method).	Dr Kakali Talukdar	04	Oct	
4	• Report on a visit to National Park/Biodiversity Park/Wild life sanctuary	Due to pandemic situation this time it will not be conducted			

Semester	TDC I Semester	Course	Major
Credit	04	Marks:	60
Paper Name	ANIMAL DIVERSITY	Paper No:	ZOO-HG/RC-1016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Kingdom Protista: General characters and classification up to classes; Locomotory Organelles and locomotion in Protozoa	Dr Sikha Rani Kalita	03	Sep	
2	• Porifera: General characters and classification up to classes; Canal System in Sycon		03	Sep	
3	• Cnidaria: General characters and classification up to classes;		02	Oct Nov,	

	Polymorphism in Hydrozoa				
4	• Platyhelminthes: General characters and classification up to classes; Life history of Taenia solium	Dr Kakali Talukdar	03	Sep	
5	• Nematelminthes: General characters and classification up to classes; Life history of Ascaris lumbricoides and its parasitic adaptations		04	Sep	
6	• Annelida: General characters and classification up to classes; Metamerism in Annelida		03	Oct	
7	• Arthropoda: General characters and classification up to classes; Vision in Arthropoda, Metamorphosis in Insects	Bandana Deka	04	Sep	
8	• Mollusca: General characters and classification up to classes; Torsion in gastropods		03	Sep	
9	• Echinodermata: General characters and classification up to classes; Water-vascular system in Asteroidea		03	Oct, Nov	
10	• Protochordates: General features and Phylogeny of Protochordata	Dr Kakali Talukdar	03	Oct	
11	• Agnatha: General features of Agnatha and classification of cyclostomes up to classes		03	Oct	
12	• Pisces: General features and Classification up to orders; Osmoregulation in Fishes	Dr Sikha Rani Kalita	02	Sep	
13	• Amphibia: General features and Classification up to orders; Parental care		02	Sep	
14	• Reptiles: General features and Classification up to orders; Poisonous and non-poisonous snakes, Biting mechanism in snakes		03	Oct Nov,	
15	• Aves: General features and Classification up to orders; Flight adaptations in birds	Bandana Deka	03	Oct	
16	• Mammals: Classification up to orders; Origin of mammals		03	Oct	

Semester	TDC I Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HG/RC-1016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> Study of the following specimens: Amoeba, Euglena, Plasmodium, Paramecium, Sycon, Hyalonema, and Euplectella, Obelia, Physalia, Aurelia, Tubipora, Metridium, Taeniasolium, Male and female Ascaris lumbricoides, Aphrodite, Nereis, Pheretima, Hirudinaria, Palaemon, Cancer, Limulus, Palamnaeus, Scolopendra, Julus, Periplaneta, Apis, Chiton, Dentalium, Pila, Unio, Loligo, Sepia, Octopus, Pentaceros, Ophiura, Echinus, Cucumaria and Antedon, Balanoglossus, Herdmania, Branchiostoma, Petromyzon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Anguilla, Ichthyophis/Ureotyphlus, Salamandra, Bufo, Hyla, Chelone, Hemidactylus, Chamaeleon, Draco, Vipera, Naja, Crocodylus, Gavialis, Any six common birds from different orders, Sorex, Bat, Funambulus, Loris 	Bandana Deka Dr Sikha Rani Kalita Dr Kakali Talukdar	06 06 04	Sep Oct Oct	
2	<ul style="list-style-type: none"> Study of the following permanent slides: T.S. and L.S. of Sycon, Study of life history stages of Taenia, T.S. of Male and female Ascaris 	Dr Kakali Talukdar	06	Sep	
3	<ul style="list-style-type: none"> Key for Identification of poisonous and non-poisonous snakes 	Dr Sikha Rani Kalita	02	Oct	

Semester	TDC III Semester	Course	Major
Credit	04	Marks:	60
Paper Name	PHYSIOLOGY AND BIOCHEMISTRY	Paper No:	ZOO-HC-3016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Introduction to Chordates General characteristics and outline classification	Dr Sikha Rani Kalita	01	Sep	
2	• Protochordata General characteristics of Hemichordata, Urochordata and Cephalochordata; Study of larval forms in protochordates; Retrogressive metamorphosis in Urochordata		04	Sep	
3	• Origin of Chordata Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata		02	Sep,	
4	• Agnatha General characteristics and classification of cyclostomes up to class		01	Sep	
5	• Pisces General characteristics of Chondrichthyes and Osteichthyes, classification upto order Migration, Osmoregulation and Parental care in fishes		02	Sep	
6	• Amphibia Origin of Tetrapoda (Evolution of terrestrial ectotherms); General characteristics and classification upto order; Parental care in Amphibians	Bandana Deka	05	Sep	
7	• Reptilia General characteristics and classification up to order; Affinities of Sphenodon; Poison apparatus and Biting mechanism in snakes	Dr Sikha Rani Kalita	02	Oct, Nov	
8	• Aves General characteristics and classification up to order Archaeopteryx-- a connecting link; Principles and aerodynamics of flight, Flight adaptations and Migration in birds	Bandana Deka	05	Nov	
9	• Mammals General characters and classification up to order; Affinities of Prototheria; Adaptive radiation with reference to locomotory appendages	Bandana Deka	04	Oct	

10	<ul style="list-style-type: none"> Zoogeography Zoo geographical realms, Theories pertaining to distribution of animals, Plate tectonic and Continental drift theory, distribution of vertebrates in different realms 	Dr Kakali Talukdar	04	Oct	
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Semester	TDC III Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-3016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> Protochordata Balanoglossus, Herdmania, Branchiostoma, Colonial Urochordata Sections of Balanoglossus through proboscis and branchio genital regions, Sections of Amphioxus through pharyngeal, intestinal and caudal regions. Permanent slide of Herdmania spicules 	Dr Sikha Rani Kalita	04	Oct	
2	<ul style="list-style-type: none"> Agnatha Petromyzon, Myxine 		02	Oct	
3	<ul style="list-style-type: none"> Fishes Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon/ Diodon, Anabas, Flat fish 		02	Oct	
4	<ul style="list-style-type: none"> Amphibia Ichthyophis/Ureotyphlus, Necturus, Bufo, Hyla, Alytes, Salamandra 		02	Nov	
5	<ul style="list-style-type: none"> Reptilia Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus Key for Identification of poisonous and non-poisonous snakes 		04	Nov	
6	<ul style="list-style-type: none"> Aves Study of six common birds from different orders. Types of beaks and claws 	Bandana Deka	04	Oct	
7	<ul style="list-style-type: none"> Mammalia Sorex, Bat (Insectivorous and Frugivorous), Funambulus, Loris, Herpestes, Erinaceous. 		02	Oct	
8	<ul style="list-style-type: none"> Mount of weberian ossicles of fish 	Dr Sikha Rani Kalita		Nov	

9	<ul style="list-style-type: none"> Power point presentation on study of any two animals from two different classes by students (may be included if dissections not given permission) 	Bandana Deka	Each student will be given to prepare a power point presentation individually on a topic given in the syllabus (within Nov)
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Semester	TDC III Semester	Course	Major
Credit	04	Marks:	60
Paper Name	ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS	Paper No:	ZOO-HC-3026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> Tissues: Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous 	Dr Sikha Rani Kalita	05	Sep	
2	<ul style="list-style-type: none"> Bone and Cartilage: Structure and types of bones and cartilages, Ossification, bone growth and resorption 	Bandana Deka	04	Sep	
3	<ul style="list-style-type: none"> 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 - reflex arc; Physiology of hearing and vision. 		08	Oct	
4	<ul style="list-style-type: none"> Muscle: Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanus 		04	Oct	
5	<ul style="list-style-type: none"> Reproductive System: Histology of testis and ovary; Physiology of male and female reproduction; Puberty, Methods of contraception in male and female 	Dr Sikha Rani Kalita	04	Oct	

6	<ul style="list-style-type: none"> Endocrine System: Histology of endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas, adrenal; hormones secreted by them and their mechanism of action; Classification of hormones; Regulation of their secretion; Mode of hormone action, Signal transduction pathways for steroidal and non-steroidal hormones Hypothalamus (neuroendocrine gland)- principal nuclei involved in neuro endocrine control of anterior pituitary and endocrines system; Placental hormones 	Bandana Deka	10	Oct	
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Semester	TDC III Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-3026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex) 	Bandana Deka	02	Oct, Nov	
2	<ul style="list-style-type: none"> Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells 	Dr Kakali Talukdar	02	Dec	
3	<ul style="list-style-type: none"> Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid 	Bandana Deka	04	Dec	
4	<ul style="list-style-type: none"> Microtomy: Preparation of permanent slide of any five mammalian (Goat/ rat/mice) tissue 	Dr Kakali Talukdar	08	Dec, Jan	

Semester	TDC III Semester	Course	Major
Credit	04	Marks:	60
Paper Name	FUNDAMENTALS OF BIOCHEMISTRY	Paper No:	ZOO-HC-3036

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Carbohydrates Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates	Dr Kakali Talukdar	02	Sep	
2	• Lipids Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids, Steroids		03	Sep	
3	• Proteins Amino acids: Structure, Classification and General properties of α amino acids; Physiological importance of essential and non-essential α amino acids Proteins: Bonds stabilizing protein structure; Levels of organization in proteins; Denaturation; Introduction to simple and conjugate proteins Immunoglobulins: Basic Structure, Classes and Function, Antigenic Determinants		04	Sep	
4	• Nucleic Acids Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleicacids Cot Curves: Base pairing, Denaturation and Renaturation of DNA Types of DNA and RNA, Complementarity of DNA, Hpyo- Hyperchromaticity of DNA		04	Sep	
5	• Enzymes Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions; Derivation of Michaelis-Menten equation, Concept of Km and Vmax, Lineweaver_Burk plot; Multi-substrate reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Regulation of enzyme action		04	Oct, Nov	

Semester	TDC III Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-3036

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Qualitative tests of functional groups in carbohydrates, proteins and lipids.	Dr Kakali Talukdar	04	Sep	
2	• Paper chromatography of amino acids.	Bandana Deka	04	Sep	
3	• Action of salivary amylase under optimum conditions.	Dr Kakali Talukdar	02	Oct	
4	• Effect of pH, temperature on the action of salivary amylase.		02	Oct	
5	• Demonstration of proteins separation by SDS-PAGE.		02	Nov	

Semester	TDC III Semester	Course	Major
Credit	04	Marks:	60
Paper Name	PHYSIOLOGY AND BIOCHEMISTRY	Paper No:	ZOO-HG/RC-3016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Nerve and muscle Structure of a neuron, Resting membrane potential, Graded potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres, Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction	Bandana Deka	05	Sep	
2	• Digestion Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids	Dr Sikha Rani Kalita	04	Sep	
3	• Respiration Pulmonary ventilation, Respiratory volumes and capacities, Transport of Oxygen and carbon dioxide in blood	Bandana Deka	03	Oct	
4	• Excretion Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism	Dr Sikha Rani Kalita	04	Oct	

5	• Cardiovascular system Composition of blood, Haemostasis, Structure of Heart, Origin and conduction of the cardiac impulse, Cardiac cycle	Bandana Deka	04	Oct	
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 pituitary, thyroid, Parathyroid, pancreas and adrenal	Dr Sikha Rani Kalita	08	Oct	
7	• Carbohydrate Metabolism Glycolysis, Krebs Cycle, Pentose phosphate pathway, Gluconeogenesis, Glycogen metabolism, Review of electron transport chain	Dr Kakali Talukdar	06	Nov	
8	• Lipid Metabolism Biosynthesis and β oxidation of palmitic acid		02	Oct	
9	• Protein metabolism Transamination, Deamination and Urea Cycle		03	Nov	
10	• Enzymes Introduction, Mechanism of action, Enzyme Kinetics, Inhibition and Regulation		04	Dec	

Semester	TDC III Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HG/RC-3016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Preparation of hemin crystals	Bandana Deka	02	Oct	
2	• Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland	Dr Sikha Rani Kalita	04	Oct	
3	• Study of permanent slides of spinal cord, duodenum, liver, lung, kidney, bone, cartilage		02	Nov	
4	• Qualitative tests to identify functional groups of carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose)	Dr Kakali Talukdar	04	Oct	
5	• Estimation of total protein in given solutions by Lowry's method.		02	Nov	
6	• Study of activity of salivary amylase under optimum conditions		02	Nov	

Semester	TDC III Semester	Course	Major
Credit	04	Marks:	50+50
Paper Name	Ornamental Fish & Fisheries	Paper No:	ZOO-SE-3016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Ornamental Fish Diversity of North East India.	Bandana Deka	02	Sep	
2	• Aquarium plant diversity in the wetland of Assam.	Dr Sikha Rani Kalita	02	Sep	
3	• Construction and management of Home Aquarium.	Bandana Deka	02	Sep	
4	• Natural feed of Ornamental Fish		02	Sep	
5	• Strategies for maintenance of natural colour of Ornamental Fish		04	Oct	
6	• Natural Breeding of Tricogaster species	Dr Sikha Rani Kalita	02	Oct	
7	• Health management of Ornamental Fish	Dr Kakali Talukdar	02	Sep	
8	• Feed formulation of Ornamental Fish		02	Sep	
9	• Development of Biological filtration in Aquarium		02	Oct	
10	• Pure culture of planktons	Dr Sikha Rani Kalita	01	Oct	
Practical					

1	• Identification of Ornamental Fish	Bandana Deka	02	Oct	
2	• Culture of Indigenous ornamental fish in Aquarium	Dr Sikha Rani Kalita	04	Oct	
3	• Estimation of Physico-chemical characteristics of Aquarium water	Dr Kakali Talukdar	02	Nov	
4	• Biological filter for removal of Ammonia from Aquarium		04	Oct	
5	• Culture of Planktons	Dr Sikha Rani Kalita	02	Nov	

Semester	TDC III Semester	Course	Major
Credit	04	Marks:	60
Paper Name	MOLECULAR BIOLOGY	Paper No:	ZOO-HC-5016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Nucleic Acids Salient features of DNA and RNA Watson and Crick model of DNA	Bandana Deka	02	Sep	
2	• DNA Replication DNA Replication in prokaryotes and eukaryotes, mechanism of DNA replication, Semi-conservative, bidirectional and semi_discontinuous replication, RNA priming, Replication of circular and linear ds-DNA, replication of telomeres	Dr Kakali Talukdar	08	Sep	
3	• Transcription RNA polymerase and transcription Unit, mechanism of transcription in prokaryotes and eukaryotes, synthesis of rRNA and mRNA, transcription factors		04	Sep	
4	• Translation Geneticcode, Degeneracy of the genetic code and Wobble Hypothesis; Process 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; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation		08	Sep	
5	• Post Transcriptional Modifications and Processing of Eukaryotic RNA Structure of globin mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA Genetic impr3i0nting		04	Oct	
6	• Gene Regulation Transcription regulation in prokaryotes: Principles of transcriptional regulation with examples from lac operon and trpoperon; Transcription regulation in eukaryotes: Activators, repressors, enhance rs, silencer elements; Gene	Bandana Deka	05	Sep	

	silencing,				
7	• DNA Repair Mechanisms Pyrimidine dimerization and mismatch repair	Dr Kakali Talukdar	02	Sep	
8	• Regulatory RNAs Ribo-switches, RNA interference, miRNA, siRNA		02	Oct	

Semester	TDC III Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-5016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Study of Polytene chromosomes from Chironomous / Drosophila larvae	Bandana Deka	04	Sep	
2	• Preparation of liquid culture medium (LB) and raise culture of E. coli	Dr Kakali Talukdar	02	Oct	
3	• Estimation of the growth kinetics of E. coli by turbidity method	Bandana Deka	02	Oct	
4	• Quantitative estimation DNA using colorimeter (Diphenylamine reagent)	Dr Kakali Talukdar	02	Oct	
5	• Quantitative estimation of RNA using Orcinol reaction		02	Oct	
6	• Study and interpretation of electron micrographs/ photograph showing • (a) DNA replication • (b) Transcription • (c) Splitgenes		04	Oct	

Semester	TDC III Semester	Course	Major
Credit	04	Marks:	60
Paper Name	PRINCIPLES OF GENETICS	Paper No:	ZOO-HC-5026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Mendelian Genetics and its Extension Principles of inheritance, Incomplete dominance and codominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Sex-linked, sex- influenced and sex-limited characters inheritance.	Bandana Deka	05	Sep	
2	• Linkage, Crossing Over and Chromosomal Mapping Linkage and crossing over, Cytological basis of crossing over, Molecular mechanisms of crossing over including models of recombination, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses, Interference and coincidence, Somatic cell hybridization.		04	Oct	
3	• Mutations Types of gene mutations (Classification), Types of chromosomal aberrations (Classification, figures and with one suitable example of each), Molecular basis of mutations in relation to UV light and chemical mutagens; Detection of mutations: CLB method, attached X method.	Dr Sikha Rani Kalita	09	Sep	
4	• Sex Determination Chromosomal mechanisms of sex determination in Drosophila and Man		02	Sep	
5	• Extra-chromosomal Inheritance Criteria for extra-chromosomal inheritance, Antibiotic resistance in Chlamydomonas, Mitochondrial mutations in Saccharomyces, Infective heredity in Paramecium and Maternal effects		04	Sep	
6	• Polygenic Inheritance Polygenic inheritance with suitable examples; simple numericals based on it.		02	Sep	
7	• Recombination in Bacteria and Viruses Conjugation, Transformation, Transduction, Complementation test in		03	Oct	

	Bacteriophage elements in Drosophila, Transposons in humans			
8	• Unit 8: Transposable Genetic Elements Transposons in bacteria, Ac-Ds elements in maize and P		03	Oct

Semester	TDC III Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-5026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• To study the Mendelian laws and gene interactions.	Dr Sikha Rani Kalita	02	Sep	
2	• Chi-square analyses using seeds/beads/Drosophila.		02		
3	• Linkage maps based on data from conjugation, transformation and transduction.	Bandana Deka	04	Oct	
4	• Linkage maps based on data from Drosophila crosses.		02	Oct	
5	• Study of human karyotype (normal and abnormal).	Dr Sikha Rani Kalita	02	Nov	
6	• Pedigree analysis of some human inherited traits.		02	Nov	

Semester	TDC III Semester	Course	Major
Credit	04	Marks:	60
Paper Name	COMPUTATIONAL BIOLOGY and BIOSTATICS	Paper No:	ZOO-HE-5016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Introduction to Bioinformatics Importance, Goal, Scope; Genomics, Transcriptomics, Systems Biology, Functional Genomics, Metabolomics, Molecular Phylogeny; Applications	Dr Kakali Talukdar	02	Sep	

	and Limitations of Bioinformatics				
2	<ul style="list-style-type: none"> Biological Databases Introduction to biological databases; Primary, secondary and composite databases; Nucleic acid databases (GenBank, DDBJ, EMBL and NDB); Protein databases (PIR, SWISS-PROT, TrEMBL, PDB); Metabolic pathway database (KEGG, Eco Cyc, and Meta Cyc); Small molecule databases (PubChem, Drug Bank, ZINC, CSD) 	Guest Lecture	03	Sep	
3	<ul style="list-style-type: none"> Data Generation and Data Retrieval Generation of data (Gene sequencing, Protein sequencing, Mass spectrometry, Microarray), Sequence submission tools (BankIt, Sequin, Webin); Sequence file format (flat file, FASTA, GCG, EMBL, Clustal, Phylip, Swiss-Prot); Sequence annotation; Data retrieval systems (SRS, Entrez) 		04	Oct	
4	<ul style="list-style-type: none"> Basic Concepts of Sequence Alignment Scoring Matrices (PAM, BLOSUM), Methods of Alignment (Dot matrix, Dynamic Programming, BLAST and FASTA); Local and global alignment, pair wise and multiple sequence alignments; Similarity, identity and homology of sequences 		04	Oct	
5	<ul style="list-style-type: none"> Applications of Bioinformatics Structural Bioinformatics (3-D protein, PDB), Functional genomics (genome- wide and high throughput approaches to gene and protein function), Drug discovery method (Basic concepts) 		04	Oct	
6	<ul style="list-style-type: none"> Biostatistics Introduction, calculation of standard deviation, standard error, Co_efficient of Variance, Chi-square test, Z test, t-Test 	Dr Sikha Rani Kalita	03	Nov	

Semester	TDC III Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HE-5016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Accessing biological databases	Bandana Deka	04	Oct	
2	• Retrieval of nucleotide and protein sequences from the databases.		04	Oct	
3	• To perform pair-wise alignment of sequences (BLAST) and interpret the output		02	Nov	
4	• Predict the structure of protein from its amino acid sequence.		02	Nov	
5	• To perform a “two-sample t- test” for a given set of data	Dr Sikha Rani Kalita	02	Nov	
6	• To learn graphical representations of statistical data with the help of computers (e.g. MS Excel).	Bandana Deka	04	Nov	

Semester	TDC III Semester	Course	Major
Credit	04	Marks:	60
Paper Name	PARASITOLOGY	Paper No:	ZOO-HE-5046

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Introduction to Parasitology Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship	Dr Kakali Talukdar	02	Sep	
2	• Parasitic Protists Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Entamoeba histolytica, Giardia intestinalis, Trypanosoma magambiense, Leishmania donovani, Plasmodium vivax	Dr Sikha Rani Kalita	03	Sep	
3	• Parasitic Platyhelminthes Study of Morphology, Life Cycle,		04	Nov	

	Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of <i>Fasciolopsis buski</i> , <i>Schistosoma haematobium</i> , <i>Taenia solium</i> and <i>Hymenolepis nana</i>	Dr Kakali Talukdar			
4	• Parasitic Nematodes Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of <i>Ascaris lumbricoides</i> , <i>Ancylostoma duodenale</i> , <i>Wuchereria bancrofti</i> and <i>Trichinella spiralis</i> . Study of structure, life cycle and importance of <i>Meloidogyne</i> (root knot nematode), <i>Pratylenchus</i> (lesion nematode)	Dr Sikha Rani Kalita	04	Nov	
5	• Parasitic Arthropoda Biology, importance and control of ticks, mites, <i>Pediculus humanus</i> (head and body louse), <i>Xenopsylla cheopis</i> and <i>Cimex lectularius</i>	Bandana Deka	04	Oct	
6	• Parasitic Vertebrates A brief account of parasitic vertebrates; Cookicutter Shark, Candiru, Hood Mockingbird and Vampire bat	Dr Kakali Talukdar	03	Nov	

Semester	TDC III Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HE-5046

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Study of life stages of <i>Entamoeba histolytica</i> , <i>Giardia intestinalis</i> , <i>Trypanosoma gambiense</i> , <i>Leishmania donovani</i> and <i>Plasmodium vivax</i> through permanent slides/microphotographs	Dr Kakali Talukdar	04	Oct	
2	• Study of adult and life stages of <i>Fasciolopsis buski</i> , <i>Schistosoma mahaematobium</i> , <i>Taenia solium</i> and <i>Hymenolepis nana</i> through permanent slides/microphotographs		04	Oct	
3	• Study of adult and life stages of <i>Ascaris lumbricoides</i> , <i>Ancylostoma duodenale</i> , <i>Wuchereria bancrofti</i> and <i>Trichinella spiralis</i> through permanent slides/microphotographs		02	Nov	
4	• Study of plant parasitic root knot nematode, <i>Meloidogyne</i> from the soil sample	Dr Sikha Rani Kalita	02	Nov	

5	• Study of <i>Pediculus humanus</i> (Head louse and Body louse), <i>Xenopsylla cheopis</i> and <i>Cimex lectularius</i> through permanent slides/photographs	Bandana Deka	02	Nov	
6	• Study of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market as by product of the industry]	Dr Sikha Rani Kalita	02	Oct	
7	• Study of nematode/cestode parasites from the intestines of Poultry bird [Intestine can be procured from poultry/market as a byproduct]		02	Nov	

Semester	TDC III Semester	Course	Major
Credit	04	Marks:	60
Paper Name	APPLIED ZOOLOGY	Paper No:	ZOO-RE-5026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Introduction to Host-parasite Relationship Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis	Dr Kakali Talukdar	04	Sep	
2	• Epidemiology of Diseases Transmission, Prevention and control of diseases: Tuberculosis, typhoid	Bandana Deka	03	Sep	
3	• Rickettsiae and Spirochaetes Brief account of Rickettsia prowazekii, Borreliare currentis and Treponema pallidum	Dr Sikha Rani Kalita	04	Sep	
4	• Parasitic Protozoa Life history and pathogenicity of Entamoeba histolytica, Plasmodium vivax and Trypanosoma gambiense	Dr Kakali Talukdar	03	Sep	
5	• Parasitic Helminthes Life history and pathogenicity of Ancylostoma duodenale and Wuchereria bancrofti		03	Oct	
6	• Insects of Economic Importance Biology, Control and damage caused by Helicoverpa armigera, Pyrausta nactella and Plutella maculipennis, Callosobruchus chinensis, Sitophilus oryzae and Tribolium castaneum	Dr Sikha Rani Kalita	04	Oct	
7	• Insects of Medical Importance Medical importance and control of	Bandana Deka	03	Oct	

	Pediculus humanus corporis, Anopheles, Culex, Aedes, Xenopsylla cheopis				
8	• Animal Husbandry Preservation and artificial insemination in cattle; Induction of early puberty and synchronization of estrus in cattle	Dr Kakali Talukdar	04	Nov	
9	• Poultry Farming Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs	Bandana Deka	03	Nov	
10	• Fish Technology Genetic improvements in aquaculture industry; Induced breeding and transportation of fish seed	Dr Sikha Rani Kalita	03	Nov	

Semester	TDC III Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-RE-5026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Study of Plasmodium vivax, Entamoeba histolytica, Trypanosoma gambiense, Ancylostoma duodenale and Wuchereria bancrofti and their life stages through permanent slides/photomicrographs or specimens.	Dr Kakali Talukdar	02	Sep	
2	• Study of arthropod vectors associated with human diseases: Pediculus, Culex, Anopheles, Aedes and Xenopsylla.	Bandana Deka	04	Sep	
3	• Study of insect damage to different plant parts/stored grains through damaged products/photographs.	Dr Sikha Rani Kalita	02	Sep	
4	• Identifying feature and economic importance of Helicoverpa (Heliothis) armigera, Papilio demoleus, Pyrrilla perpusilla, Callosobruchus chinensis, Sitophilus oryzae and Tribolium castaneum	Bandana Deka	04	Oct	
5	• Visit to poultry farmer animal breeding centre. Submission of visit report	Dr Sikha Rani Kalita Dr Kakali Talukdar	04		Due to pandemic situation this time it will not be conducted
6	• Maintenance of fresh water aquarium	Dr Sikha Rani Kalita	02	Nov	

Even Semester

Semester	TDC II Semester	Course	Major
Credit	04	Marks:	60
Paper Name	NON-CHORDATES II: COELOMATES	Paper Code:	ZOO-HC-2016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Introduction to Coelomates Evolution of coelom and metamerism	Dr Sikha Rani Kalita	02	Feb	
2	• General characteristics and Classification upto classes Excretion in Annelida		03	Feb	
3	• Arthropoda General characteristics and Classification upto classes Vision and Respiration in Arthropoda Metamorphosis in Insects Social life in bees and termites	Bandana Deka	07	Feb, Mar	
4	• Onychophora General characteristics and Evolutionary significance	Dr Sikha Rani Kalita	03	Mar, Apr	
5	• Mollusca General characteristics and Classification upto classes Respiration in Mollusca Torsion and detorsion in Gastropoda Pearl formation in bivalves Evolutionary significance of trochophore larva	Bandana Deka	06	Mar, Apr	
6	• Echinodermata General characteristics and Classification upto classes Water-vascular system in Asteroidea Larval forms in Echinodermata Affinities with Chordates	Dr Sikha Rani Kalita	10	Mar, Apr, May	

Semester	TDC II Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-2016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> • Study of following specimens: Annelids-Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria 2 	Dr Sikha Rani Kalita	02	Apr	
	<ul style="list-style-type: none"> • Arthropods - Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta, termites and honey bees Onychophora - Peripatus 	Bandana Deka	04	Mar	
	<ul style="list-style-type: none"> • Molluscs - Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia, Octopus, Nautilus 		02	Apr	
	<ul style="list-style-type: none"> • Echinodermates - Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon 		02	Mar	
2	<ul style="list-style-type: none"> • Study of digestive system septal nephridia and pharyngeal nephridia of earthworm 	Dr Sikha Rani Kalita	02	Mar	
3	<ul style="list-style-type: none"> • T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm 		02	Mar	
4	<ul style="list-style-type: none"> • Mount of mouth parts and dissection of digestive system and nervous system of Periplaneta 	Bandana Deka	04	Apr	
5	<ul style="list-style-type: none"> • To submit a Project Report on any related topic to larval forms (crustacean, mollusc and echinoderm) 	Bandana Deka	Each student will be given to prepare a project report individually on a topic given in the syllabus (within Apr)		

Semester	TDC II Semester	Course	Major
Credit	04	Marks:	60
Paper Name	CELL BIOLOGY	Paper Code:	ZOO-HC-2026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	•Over view of Cells 3 Prokaryotic and Eukaryotic cells, Virus, Viroids, Mycoplasma, Prions	Dr Kakali Talukdar	03	Feb	
2	•Plasma Membrane 7 Various models of plasma membrane structure Transport across membranes: Active and Passive transport, Facilitated transport Cell junctions: Tight junctions, Desmosomes, Gapjunctions		04	Feb	
3	•Endomembrane System 10 Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes		04	Mar	
4	•Mitochondria and Peroxisomes 8 Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis Mitochondrial Respiratory Chain, Chemi-osmotichypothesis Peroxisomes		04	Mar	
5	•Cytoskeleton 8 Structure and Functions: Microtubules, Microfilaments and Intermediate filaments		02	Mar	
6	•Nucleus 12 Structure of Nucleus: Nuclearenvelope, Nuclear pore complex, Nucleolus Chromatin: Euchromatin and Hetrochromatin and packaging(nucleosome)		04	Apr	
7	•Cell Division Mitosis, Meiosis, Cell cycle and its regulation 8		03	Apr	
8	•Cell Signaling GPCR and Role of second messenger (cAMP)		02	May	

Semester	TDC II Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-2026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Preparation of temporary stained squash of onion root tip to study various stages of mitosis	Dr Kakali Talukdar	02	Feb	
2	• Study of various stages of meiosis.		02	Mar	
3	• Preparation of permanent slide to show the presence of Barrbody in human female blood cells/cheek cells.	Dr Sikha Rani Kalita	04	Mar	
4	• Preparation of permanent slide to demonstrate: i DNA by Feulgen reaction ii Mucopolysaccharides by PAS reaction iii Proteins by Mercurio bromophenol blue/FastGreen	Dr Kakali Talukdar	06	Mar, Apr	

Semester	TDC II Semester	Course	Major
Credit	04	Marks:	60
Paper Name	COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES	Paper Code:	ZOO-HG/RC-2016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Integumentary System 4 Derivatives of integument w.r.t. glands and digital tips	Dr Sikha Rani Kalita	02	Feb	
2	• Skeletal System Evolution of visceral arches		02	Feb, Mar	
3	• Digestive System Brief account of alimentary canal and digestive glands		03	Mar	

4	•Respiratory System Brief account of Gills, lungs, air sacs and swim bladder	Bandana Deka	04	Feb,	
5	•Circulatory System Evolution of heart and aortic arches		04	Mar,	
6	•Urinogenital System Succession of kidney, Evolution of urinogenital ducts	Dr Sikha Rani Kalita	03	Apr	
7	•Nervous System Comparative account of brain	Bandana Deka	02	Mar,	
8	•Sense Organs Types of receptors		02	Mar,	
9	•Early Embryonic Development Gametogenesis: Spermatogenesis and oogenesis w.r.t. mammals, vitellogenesis in birds; Fertilization: external (amphibians), internal (mammals), blocks to polyspermy; Early development of frog and humans (structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula); types of morphogenetic movements; Fate of germ layers; Neurulation in frog embryo.	Dr Kakali Talukdar	12	Mar, Apr	
10	•Late Embryonic Development Implantation of embryo in humans, Formation of human placenta and functions, other types of placenta on the basis of histology; Metamorphic events in frog life cycle and its hormonal regulation.	Bandana Deka Dr Sikha Rani Kalita	06 02	Apr Apr	
11	•Control of Development Fundamental processes in development (brief idea) – Gene activation, determination, induction, Differentiation, morphogenesis, intercellular communication, cell movements and cell death	Dr Kakali Talukdar	08	Apr, May	

Semester	TDC II Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HG/RC-2016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	•Osteology: a) Disarticulated skeleton of fowl and rabbit		06	Feb, Mar	

	b) Carapace and plastron of turtle/tortoise c) Mammalian skulls: One herbivorous and one carnivorous animal.	Dr Sikha Rani Kalita			
2	•Frog - Study of developmental stages - whole mounts and sections through permanent slides – cleavage stages, blastula, gastrula, neurula, tail bud stage, tadpole external and internal gill stages.	Dr Kakali Talukdar	08	Mar	
3	•Study of the different types of placenta histological sections through permanent slides or photomicrographs.	Bandana Deka	02	Mar	
4	•Examination of gametes - frog/rat - sperm and ova through permanent slides or photomicrographs.		02	Apr	

Semester	TDC IV Semester	Course	Major
Credit	04	Marks:	60
Paper Name	COMPARATIVE ANATOMY OF VERTEBRATES	Paper Code:	ZOO-HC-4016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	•Integumentary System Structure, functions and derivatives of integument	Dr Sikha Rani Kalita	02	Feb	
2	•Skeletal System Overview of axial and appendicular skeleton, Jaw suspensorium, Visceral arches		03	Feb	
3	•Digestive System Alimentary canal and associated glands, dentition		02	Mar	
4	•Respiratory System Skin, gills, lungs and air sacs; Accessory respiratory organs		03	Mar,	
5	•Circulatory System General plan of circulation, evolution of heart and aortic archs	Bandana Deka	03	Feb	
6	•Urinogenital System Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri	Dr Sikha Rani Kalita	03	Mar	
7	•Nervous System Comparative account of brain Autonomic	Bandana Deka	03	Mar	

	nervous system, Spinal cord, Cranial nerves in mammals			
8	•Sense Organs Classification of receptors Brief account of visual and auditory receptors in man		04	Mar

Semester	TDC IV Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-4016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	•Study of placoid, cycloid and ctenoid scales through permanent slides/photographs	Bandana Deka	02	Apr	
2	• Disarticulated skeleton of Frog, Fowl, Rabbit	Dr Sikha Rani Kalita	02	Mar	
3	• Carapace and plastron of turtle/tortoise		02		
4	•Mammalian skulls: One herbivorous and one carnivorous animal		02	Mar	
5	•Study of structure of any two organs (heart, lung, kidney, eye and ear) from video recording (may be included if dissection not permitted)	Bandana Deka	04	May	
6	•Project on skeletal modifications in vertebrates (may be included if dissection not permitted)	Dr Sikha Rani Kalita	Each student will be given to prepare a project report individually on a topic given in the syllabus (within Apr)		

Semester	TDC IV Semester	Course	Major
Credit	04	Marks:	60
Paper Name	ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS	Paper Code:	ZOO-HC-4026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	•Physiology of Digestion Structural organization and functions of	Dr Sikha Rani Kalita	04	Mar, Apr	

	gastrointestinal tract and associated glands; Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Hormonal control of secretion of enzymes in Gastrointestinal tract.				
2	<ul style="list-style-type: none"> •Physiology of Respiration Histology of trachea and lung; Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood; Respiratory pigments, Dissociation curves and the factors influencing it; Carbon monoxide poisoning; Control of respiration 	Bandana Deka	07	Feb, Mar,	
3	<ul style="list-style-type: none"> •Renal Physiology Structure of kidney and its functional unit; Mechanism of urine formation; Regulation of water balance; Regulation of acid-base balance 	Dr Sikha Rani Kalita	04	Apr	
4	<ul style="list-style-type: none"> •Blood Components of blood and their functions; Structure and functions of haemoglobin Haemostasis: Blood clotting system, Kallikrein-Kininogen system, Complement system& Fibrinolytic system, Haemopoiesis Blood groups: Rh factor, ABO and MN 	Bandana Deka	05	Mar,	
5	<ul style="list-style-type: none"> •Physiology of Heart Structure of mammalian heart; Coronary circulation; Structure and working of conducting myocardial fibers.Origin and conduction of cardiac impulses Cardiac cycle; Cardiac output and its regulation, Frank-Starling Law of the heart, nervous and chemical regulation of heart rate. Electrocardiogram, Blood pressure and its regulation 		06	Apr, May	

Semester	TDC IV Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-4026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	•Determination of ABO Blood group		02	Mar	

2	• Enumeration of red blood cells and white blood cells using haemocytometer	Bandana Deka	04	Mar	
3	• Estimation of haemoglobin using Sahli's haemoglobinometer		02	Apr	
4	• Preparation of haemin crystals		02	Mar	
5	• Recording of blood pressure using a sphygmomanometer		04	May	
6	• Examination of sections of mammalian oesophagus, stomach, duodenum, ileum, rectum liver, trachea, lung, kidney	Dr Sikha Rani Kalita			

Semester	TDC IV Semester	Course	Major
Credit	04	Marks:	60
Paper Name	BIOCHEMISTRY OF METABOLIC PROCESSES	Paper Code:	ZOO-HC-4036

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Overview of Metabolism 10 Catabolism vs Anabolism, Stages of catabolism, 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	Dr Kakali Talukdar	07	Feb	
2	• Carbohydrate Metabolism Sequence of reactions and regulation of glycolysis, Citric acid cycle, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis		06	Mar	
3	• Lipid Metabolism β -oxidation and omega-oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid; Ketogenesis		04	Mar	
4	• Protein Metabolism Catabolism of amino acids: Transamination, Deamination, Urea cycle; Fate of C-skeleton of Glucogenic and Ketogenic amino acids		05	Mar, Apr	
5	• Oxidative Phosphorylation Redox systems; Review of		05	Apr	

	mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System				
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Semester	TDC IV Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-4036

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Estimation of total protein in given solutions by Lowry's method.	Dr Kakali Talukdar	02	Mar	
2	• Detection of SGOT and SGPT in serum/tissue		04	Mar	
3	• To study the enzymatic activity of Trypsin and Lipase		02	Apr	
4	• Study of biological oxidation (SDH) [goat liver]		02	Mar	
5	• To perform the Acid and Alkaline phosphatase assay from serum/tissue		04	May	

Semester	TDC IV Semester	Course	Major
Credit	04	Marks:	60
Paper Name	GENETICS AND EVOLUTIONARY BIOLOGY	Paper Code:	ZOO-HG/RC-4016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Introduction to Genetics 3 Mendel's work on transmission of traits, Genetic Variation, Molecular basis of Genetic Information	Bandana Deka	07	Mar	
2	• Mendelian Genetics and its Extension Principles of Inheritance, Chromosome theory of inheritance, Incomplete dominance and codominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, sex linked inheritance, extra-chromosomal inheritance		06	Mar	

3	<ul style="list-style-type: none"> •Linkage, Crossing Over and Chromosomal Mapping Linkage and crossing over, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses, Interference and coincidence, Somatic cell genetics - an alternative approach to gene mapping, 		04	Apr	
4	<ul style="list-style-type: none"> •Mutations Chromosomal Mutations: Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy; Gene mutations: Induced versus Spontaneous mutations, Back versus Suppressor mutations 	Dr Sikha Rani Kalita	06	Mar,	
5	<ul style="list-style-type: none"> •Sex Determination Chromosomal mechanisms, dosage compensation 		03	Mar	
6	<ul style="list-style-type: none"> •History of Life Major Events in History of Life 		02	Apr	
7	<ul style="list-style-type: none"> •Introduction to Evolutionary Theories Lamarckism, Darwinism, Neo-Darwinism 		02	Apr	
8	<ul style="list-style-type: none"> •Direct Evidences of Evolution Types of fossils, Incompleteness of fossil record, Dating of fossils, Phylogeny of horse 		02	May	
9	<ul style="list-style-type: none"> •Processes of Evolutionary Change Organic variations; Isolating Mechanisms; Natural selection (Example: Industrial melanism); Types of natural selection (Directional, Stabilizing, Disruptive), Artificial selection 	Dr Kakali Talukdar	05	Feb, Mar	
10	<ul style="list-style-type: none"> •Species Concept Biological species concept (Advantages and Limitations); Modes of speciation (Allopatric, Sympatric) 		04	Mar	
11	<ul style="list-style-type: none"> •Unit11: Macro-evolution 5 Macro-evolutionary Principles (example: Darwin's Finches) 		01	Apr	
12	<ul style="list-style-type: none"> •Unit 12: Extinction 6 Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of extinction in evolution 		02	Apr	

Semester	TDC IV Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HG/RC-4016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Study of Mendelian Inheritance and gene interactions (Non-Mendelian Inheritance) using suitable examples. Verify the results using Chi-square test.	Bandana Deka	04	Mar	
2	• Study of Linkage, recombination, gene mapping using the data.		02	Mar	
3	• Study of Human Karyotypes (normal and abnormal).	Dr Sikha Rani Kalita	02	Apr	
4	• Study of fossil evidences from plaster cast models and pictures	Dr Kakali Talukdar	02	Mar	
5	• Study of homology and analogy from suitable specimens/pictures	Dr Sikha Rani Kalita	02	May	
6	• Charts: a) Phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse ancestors b) Darwin's Finches with diagrams/ cut outs of beaks of different species	Dr Kakali Talukdar	04	Apr	
7	• Visit to Natural History Museum and submission of report	Dr Sikha Rani Kalita Dr Kakali Talukdar	Teacher will guide and accompany the tour in the month of Mar		

Semester	TDC IV Semester	Course	Major
Credit	04	Marks:	50+50
Paper Name	NON-MULBERRY SERICULTURE	Paper No:	ZOO-SE-4016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Introduction Sericulture: Definition, history and present status of Mulberry and Non-Mulberry Sericulture; Silk route Varieties of Silk; Types and distribution of non-mulberry or wild or vanyasericigenous insects in N-E India	Dr Kakali Talukdar	03	Sep	
2	• Unit 2: Biology of Non-mulberry Silkworm: Life cycle of	Bandana Deka	03	Sep	

	silkworm- Eri and Muga Structure of silk gland and Nature of Silk				
3	<ul style="list-style-type: none"> Unit 3: Rearing of Silkworms (Eri and Muga Silkworm): Food plants of Eri and Muga Silkworm Rearing Operation: Rearing house/Site and rearing appliances Disinfectants: Formalin, bleaching powder Rearing technology: Early age and Late age rearing Environmental conditions in rearing-Temperature, Humidity, Light and Air Types of mountages Harvesting and storage of cocoons Spinning and Reeling of silk 	Dr Sikha Rani Kalita	07	Sep	
4	<ul style="list-style-type: none"> Unit 4: Pests and Diseases: Pests of eri and muga silkworm Pathogenesis of eri and muga silkworm diseases: Protozoan, viral, fungal and bacterial Prevention and control measures of pests and diseases 	Bandana Deka	04	Sep	
5	<ul style="list-style-type: none"> Unit 5: Entrepreneurship in Non-Mulberry Sericulture: Varieties of Non-Mulberry Silk products and economics in India Prospectus of Non-Mulberry Sericulture in India: Non-Mulberry Sericulture industry in different states, employment generation and potential 	Dr Kakali Talukdar	04	Oct	
6	<ul style="list-style-type: none"> Visit to various sericulture Govt. /Private Farm/ Centers 	Teacher will guide and accompany the tour in the month of Mar/Apr			

Semester	TDC VI Semester	Course	Major
Credit	04	Marks:	60
Paper Name	DEVELOPMENTAL BIOLOGY	Paper Code:	ZOO-HC-6016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> Introduction Historical perspective and basic concepts: Phases of development, Cell-Cell interaction, Pattern formation, Differentiation and growth, Differential gene expression, Cytoplasmic determinants and asymmetric cell division 	Dr Kakali Talukdar	06	Mar, Apr	

2	<ul style="list-style-type: none"> • Early Embryonic Development Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal); Changes in gametes, Blocks to polyspermy; Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers 	Dr Sikha Rani Kalita	15	Feb, Mar	
3	<ul style="list-style-type: none"> • Late Embryonic Development Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta) 	Bandana Deka	04	Feb, Mar	
4	<ul style="list-style-type: none"> • Post Embryonic Development Metamorphosis: Changes, hormonal regulations in amphibians and insects; Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each); Ageing: Concepts and Theories 		07	Mar,	
5	<ul style="list-style-type: none"> • Implications of Developmental Biology Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis 		06	Apr, May	

Semester	TDC VI Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-6016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> • Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gillstages) 	Dr Kakali Talukdar	02	Mar	

2	• Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages)	Dr Sikha Rani Kalita	04	Mar	
3	• Study of the developmental stages and life cycle of Drosophila from stock culture	Bandana Deka	02	Apr	
4	• Study of different sections of placenta (photomicrograph/slides)	Dr Sikha Rani Kalita	02	Mar	
5	• Project report on Drosophila culture/chick embryo development	Bandana Deka	Each student will be given to prepare a project report individually on a topic given in the syllabus (within Apr)		

Semester	TDC VI Semester	Course	Major
Credit	04	Marks:	60
Paper Name	EVOLUTIONARY BIOLOGY	Paper Code:	ZOO-HC-6026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Life's Beginnings: Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes	Dr Kakali Talukdar	02	Feb	
2	• Historical review of evolutionary concept: Lamarckism, Darwinism, Neo-Darwinism	Dr Sikha Rani Kalita	02	Mar	
3	• Evidences of Evolution: Fossil record (types of fossils, transitional forms, geological time scale, evolution of horse, Molecular (universality of genetic code and protein synthesising machinery, three domains of life, neutral theory of molecular evolution, molecular clock ,example of globin gene family, rRNA/cyt c	Dr Kakali Talukdar	06	Feb,	
4	• Sources of variations: Heritable variations and their role in evolution		02	Mar	

5	<ul style="list-style-type: none"> Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application of law to human Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, selection coefficient, derivation of one unit of selection for a dominant allele, genetic load, mechanism of working, types of selection, density-dependent selection, heterozygous superiority, kin selection, adaptive resemblances, sexual selection. Genetic Drift (mechanism, founder's effect, bottleneck phenomenon; Role of Migration and Mutation in changing allele frequencies 		08	Mar	
6	<ul style="list-style-type: none"> Unit6: 7 Product of evolution: Micro evolutionary changes (inter-population variations, clines, races, Species concept, Isolating mechanisms, modes of speciation—allopatric, sympatric, Adaptive radiation / macroevolution (exemplified by Galapagos finches 		04	Mar	
7	<ul style="list-style-type: none"> Extinctions, Background and mass extinctions (causes and effects), detailed example of K-Extinction 		03	Apr	
8	<ul style="list-style-type: none"> Origin and evolution of man, Unique hominin characteristics contrasted with primate characteristics, primate phylogeny from Dryopithecus leading to Homo sapiens, molecular analysis of human origin 	Bandana Deka		Mar	
9	<ul style="list-style-type: none"> Phylogenetic trees, Multiple sequence alignment, construction of phylogenetic trees, interpretation of trees 	Dr Kakali Talukdar	02	Apr	

Semester	TDC VI Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HC-6026

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> Study of fossils from models/pictures 	Dr Kakali Talukdar	02	Mar	

2	• Study of homology and analogy from suitable specimens	Dr Sikha Rani Kalita	04	Mar	
3	• Study and verification of Hardy-Weinberg Law by chi square analysis		02	Apr	
4	• Graphical representation and interpretation of data of height/weight of a sample of 100 humans in relation to their age and sex.	Bandana Deka	02	Mar	
5	• Construction of phylogenetic trees with the help of bioinformatics tools (Clustal X, Phylip, NJ) and its interpretation	Dr Kakali Talukdar	04	Apr	

Semester	TDC VI Semester	Course	Major
Credit	04	Marks:	60
Paper Name	BIOLOGY OF INSECTA	Paper Code:	ZOO-HE-6016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Introduction General Features of Insects Distribution and Success of Insects on the Earth	Dr Kakali Talukdar	06	Mar, Apr	
2	• Insect Taxonomy Basis of insect classification; Classification of insects up to orders	Dr Sikha Rani Kalita	15	Feb, Mar	
3	• General Morphology of Insects External Features; Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits Thorax: Wings and wing articulation, Types of Legs adapted to diverse habitat Abdominal appendages and genitalia	Bandana Deka	04	Feb, Mar	
4	• Physiology of Insects Structure and physiology of Insect body systems Integumentary, digestive, excretory, circulatory, respiratory, endocrine, reproductive, and nervous system Sensory receptors Growth and metamorphosis		07	Mar	
5	• Insect Society Group of social insects and their social life Social organization and social behaviour (w.r.t. any one example)		06	Apr, May	
6	• Insect Plant Interaction Theory of co-evolution, role of allelochemicals in host plant mediation Host plant selection by	Dr Sikha Rani Kalita	04	Apr	

	phytophagous insects, Insects as plant pests			
7	<ul style="list-style-type: none"> Insects as Vectors Insects as mechanical and biological vectors, Brief discussion on houseflies and mosquitoes as important insect vectors 		04	May

Semester	TDC VI Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HE-6016

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Study of one specimen from each insect	Dr Sikha Rani Kalita	02	Mar	
2	• Study of different kinds of antennae, legs and mouth parts of insects		04	Mar	
3	• Study of head and sclerites of any one insect order		02	Apr	
4	• Study of insect wings and their venation.		02	Mar	
5	• Study of insect spiracles		02	Apr	
6	• Methodology of collection, preservation and identification of insects.	Bandana Deka	02	Mar	
7	• Morphological studies of various castes of Apis, Camponotus and Odontotermes		02	Apr	
8	• Study of any three insect pests and their damages		02	Mar	
9	• Study of any three beneficial insects and their products		02	Apr	
10	Field study of insects and submission of a project report on the insect diversity			Each student will be given to prepare a project report individually on a topic given in the syllabus (within Apr)	

Semester	TDC VI Semester	Course	Major
Credit	04	Marks:	60
Paper Name	WILD LIFE CONSERVATION AND MANAGEMENT	Paper Code:	ZOO-HE-6046

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	•Introduction to Wild Life Values of wildlife-positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.	Dr Sikha Rani Kalita	06	Mar,	
2	•Evaluation and management of wild life Habitat analysis, Physical parameters: Topography, Geology, Soil and water; Biological Parameters: food, cover, forage, browse and cover estimation; Standard evaluation procedures: remote sensing and GIS.		15	Apr	
3	•Management of habitats Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity; Restoration of degraded habitats	Dr Kakali Talukdar	04	Feb, Mar	
4	•Population estimation Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation, Hair identification, Pug marks and census method.	Bandana Deka	07	Mar,	
5	•Management planning of wild life in protected areas Estimation of carrying capacity; Ecotourism/wildlife tourism in forests; Concept of climax persistence; Ecology of per turbence.	Dr Kakali Talukdar	03	Apr	
6	•Management of excess population Bio-telemetry; Care of injured and diseased animal; Quarantine; Common diseases of wild animal			Apr	
7	•Protected areas National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation-Tiger reserves in India; Management challenges in Tiger reserve				Apr

Semester	TDC VI Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-HE-6046

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Identification of flora, mammalian fauna, avian fauna, herpeto-fauna.	Dr Sikha Rani Kalita	02	Mar	
2	• Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)	Guest lecture	04	Mar	
3	• Familiarization and study of animal evidences in the field; Identification of animals through pugmarks, hoofmarks, scats, pellet groups, nest, antlers etc	Bandana Deka	02	Apr	
4	• Demonstration of different field techniques for flora and fauna	Dr Kakali Talukdar	02	Mar	
5	• PCQ, Tentree method, Circular, Square & rectangular plots, Parker's 2Stepandot her methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.	Guest lecture	02	Apr	
6	• Trail/transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)		02	Apr	

Semester	TDC VI Semester	Course	Major
Credit	04	Marks:	60
Paper Name	AQUATIC BIOLOGY	Paper Code:	ZOO-RE-6046

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	• Aquatic Biomes Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic	Dr Sikha Rani Kalita	05	Feb	

	zone and coral reefs.				
2	<ul style="list-style-type: none"> Freshwater Biology Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico-chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; dissolved gases (Oxygen, Carbon dioxide). Nutrient Cycles in Lakes-Nitrogen, Sulphur and Phosphorous. Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill-streamfishes. 	Bandana Deka	14	Feb, Mar, Apr	
3	<ul style="list-style-type: none"> Marine Biology Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds. 	Dr Kakali Talukdar	04	Mar	
4	<ul style="list-style-type: none"> Management of Aquatic Resources Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD. 	Dr Sikha Rani Kalita	07	Mar,	

Semester	TDC VI Semester	Course	Major
Credit	02	Marks:	20
Paper Name	Practical	Paper No:	ZOO-RE-6046

Unit	Course Content	Allotted to	Hours	Month	Remarks
1	<ul style="list-style-type: none"> Determine the area of a lake using graph metric and gravimetric method. 	Dr Kakali Talukdar	02	Mar	
2	<ul style="list-style-type: none"> Identify the important macrophytes, phytoplanktons and zooplanktons present in a pond/ Beel water system. 	Dr Sikha Rani Kalita	04	Mar	
3	<ul style="list-style-type: none"> Determine the amount of Turbidity/transparency, Dissolved Oxygen, Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/ waterbody. 	Bandana Deka Dr Kakali Talukdar	02+02	Apr	
4	<ul style="list-style-type: none"> Instruments used in limnology (Secchi disc, Van Dorn Bottle, 	Bandana Deka	04	Mar	

	Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.				
5	• A Project Report on a visit to a Sewage treatment plant/Marine bio_reserve/Fisheries Institutes	Dr Sikha Rani Kalita	04	Apr	



**Signature of HoD
(Bandana Deka)**