Academic session: 2018-19

Lesson Plan: Department of Zoology					
Semester	**Programme**	**Course & Name of the paper**	**Topic**	**Teacher**	**No. of Hours**
1	**HONS.**	**CC1-1-TH** Non-Chordata - I	Unit 1: Basics of Animal Classification	**PM**	**04**
			Unit 2: Protista and Metazoa	**PM, DD, SC**	**15**
			Unit 3: Porifera	**PM**	**06**
			Unit 4: Cnidaria	**SS**	**10**
			Unit 5: Ctenophora	**SS**	**02**
			Unit 6: Platyhelminthes	**DD**	**06**
			Unit 7: Nematoda	**SC**	**07**
		CC-1-1-P Non-Chordates - I	Study of whole mount of Euglena, Amoeba and Paramoecium	**PM**	**60 Hrs**
			Identification with reason & Systematic position of Amoeba, Euglena, Entamoeba, Paramecium, Plasmodium, Balantidium, Vorticella (from the prepared slides)	**PM, DD**	
			Identification with reason & Systematic position of Sycon, Poterion (Neptune's Cup), Obelia, Physalia, Aurelia, Gorgonia, Metridium, Pennatula, Madrepora, Fasciola hepatica, Taenia solium and Ascaris lumbricoides.	**SS, DD**	
			Staining/mounting of any protozoa/helminth from gut of Periplaneta sp.	**DD**	
		CC1-2-TH Molecular Biology	Unit 1: Nucleic Acids	**SK**	**03**
			Unit 2: DNA Replication	**SK**	**09**
			Unit 3: Transcription	**SK**	**09**
			Unit 4: Translation	**SK**	**09**
			Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA	**SK**	**08**
			Unit 6: Gene Regulation	**SK**	**07**
			Unit 7: DNA Repair Mechanism	**SC**	**02**
			Unit 8: Molecular Techniques	**SC**	**03**
		CC-1-2-P Molecular Biology	Demonstration of polytene and lampbrush chromosome from photograph	**PM**	**60 Hrs**
			Isolation and quantification of genomic DNA from goat liver.	**SK**	
			Agarose gel electrophoresis for DNA.	**SK**	
			Histological staining of DNA and RNA in prepared slides	**SK**	
	GENERAL	**CC1-1-TH** Animal Diversity	Unit 1: Kingdom Protista	**SS**	**02**
			Unit 2: Phylum Porifera	**PM**	**02**
			Unit 3: Phylum Cnidaria	**SS**	**02**

			Unit 4: Phylum Platyhelminthes	**DD**	**02**
			Unit 5: Phylum Nemathelminthes	**DD**	**02**
			Unit 6: Phylum Annelida	**DD**	**04**
			Unit 7: Phylum Arthropoda	**PM**	**04**
			Unit 8: Phylum Mollusca	**SS**	**02**
			Unit 9: Phylum Echinodermata	**DD**	**04**
			Unit 10: Protochordates	**SC**	**02**
			Unit 11: Agnatha	**SC**	**02**
			Unit 12: Pisces	**SS**	**04**
			Unit 13: Amphibia	**SC**	**04**
			Unit 14: Reptiles	**PM**	**04**
			Unit 15: Aves	**SC**	**04**
			Unit 16: Mammals	**SC**	**04**
		CC1-1-P Animal Diversity	Identification with reasons of the following specimens: *Amoeba, Euglena, Paramecium, Sycon, Obelia, Aurelia, Metridium, Taenia solium, Ascaris lumbricoides* (Male and female), *Aphrodite, Nereis, Hirudinaria, Palaemon, Cancer, Limulus, Apis, Chiton, Dentalium, Unio, Sepia, Octopus, Echinus, Cucumaria and Antedon, Balanoglossus, Branchiostoma, Petromyzon, Torpedo, Labeo rohita, Exocoetus, Salamandra, Hyla, Chelone, Hemidactylus, Chamaeleon, Draco, Vipera, Naja, Bat, Funambulus*	**PM & SC**	**60 Hrs**
			Key for Identification of poisonous and non-poisonous snakes	**PM**	
			Study of anatomy of digestive system, salivary gland, mouth parts of Periplaneta, Study of reproductive system of female cockroach	**PM & SC**	
			An "animal album" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose	**PM & SC**	
2	**HONS.**	**CC2-3-TH** Non-Chordates - II	Unit 1: Introduction	**PM**	**02**
			Unit 2: Annelida	**DD**	**10**
			Unit 3: Arthropoda	**PM**	**16**
			Unit 4: Onychophora	**DD**	**02**
			Unit 5: Mollusca	**SS**	**10**
			Unit 6: Echinodermata	**DD**	**08**
			Unit 7: Hemichordata	**SS**	**02**
		CC-2-3-P Non-Chordates - II	Study of following specimens: a. Annelids - Aphrodite, Nereis, Chaetopterus, Earthworm, Hirudinaria	**PM, SS**	**60**

			b. Arthropods - Limulus, Palaemon, Balanus, Eupagurus, Scolopendra, Peripatus, Silkworm – life history stages, Termite – members of a colony and Honey bee – members of the colony c. Molluscs - Dentalium, Patella, Chiton, Pila, Achatina, Pinctada, Sepia, Octopus, Nautilus d. Echinoderms - Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon		
			Anatomy study: Nervours system, Reproductive system (Male & female), Mouth parts & Salivary apparatus in Periplaneta sp	**DD**	
		CC2-4-TH Cell Biology	Unit 1: Plasma Membrane	**SC**	**07**
			Unit 2: Cytoplasmic Organelles I	**SC**	**05**
			Unit 3: Cytoplasmic Organelles II	**SK**	**07**
			Unit 4: Cytoskeleton	**SK**	**05**
			Unit 5: Nucleus	**SK**	**08**
			Unit 6: Cell Cycle	**SK**	**10**
			Unit 7: Cell Signalling	**DD**	**08**
		CC-2-4-P Cell Biology	Preparation of temporary stained squash of onion/arum root tip to study various stages of mitosis	**SK**	**60 Hrs**
			Study of various stages of meiosis from grasshopper testis	**SK**	
			Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.	**SK**	
			Preparation of permanent slide to demonstrate: a. DNA by Feulgen reaction b. Cell viability study by Trypan Blue staining	**SK**	
	GENERAL	**CC2-2-TH** Comparative Anatomy & Developmental Biology	Unit 1: Integumentary System	**SC**	**04**
			Unit 2: Digestive System	**SC**	**04**
			Unit 3: Respiratory System	**SC**	**06**
			Unit 4: Circulatory System	**SC**	**06**
			Unit 5: Urino-genital System	**SC**	**06**
			Unit 6: Early Embryonic Development	**PM**	**14**
			Unit 7: Late Embryonic Development	**PM**	**10**
		CC2-2-P Comparative Anatomy & Developmental Biology	Osteology: Limb bones, girdle and vertebra of Pigeon & Guineapig, Mammalian skulls: One herbivorous; Guinea pig and one carnivorous; Dog.	**PM & SC**	**60**
			Larval stages: Veliger, Nauplius, Trochophore, Mysis.	**SC**	

Lesson Plan –Zoology Honours(2018-19)

Name: Dr. Patralekha Mukhopadhyay

Department: Zoology

Year	Course	Unit	Topic	No. of lectures	Session
1 Hons SEM I	**CC1-1-Th**	**1**	Basics of Animal classification	6	July to Pre-Puja
		3	Porifera classification	4	
			Canal system in sponges	6	
			Spicules in sponges	4	
	CC1-1-P	**----**	Study of whole mount of Protozoans	6	July up to 2nd wk of November
			Identification of Sycon, Neptune's cup	4	
	CC1-2-P	**----**	Demonstration of polytene and lamp brush chromosome	3	
1 Hons SEM II	**CC2-3-Th**	**1**	Evolution of coelom	2	Post-winter recess
		3	Classification of Phylum Arthropoda	4	
			Respiration in prawn	2	
			Respiration in cockroach	2	
			Insect eye	1	
			Metamorphosis in Lepidopteran insects	2	
			Social life in termites	1	
	CC2-3-Pr		Identification of Annelids	6	
			Identification of Arthropods	18	

Year	Paper	Unit	Topic	No. of lectures	Session
2 Hons (Syllabus 2016 - 1+1+1)	**3**	**I Group-A (Systematics)**	1. Taxonomy: levels & scope 2. Systematics- Place & contribution of systematics in Biology 3. Classification (phenetic& cladistics) 4. Concept of dendrogram & cladogram	3 2 1 1	August to Pre-Puja
		Group-A (Systematics) **Group-B (Evolution & Adaptation)**	1. Biological species concept 2. Subspecies, Polytypic species, Sibling species & Ring species 3. Origin of birds	2 2 4	Post-Puja to Winter vacation.
		Group-A (Systematics) **Group-B (Evolution & Adaptation)**	1. Isolation & its role in speciation 2. Type concept 3. Evolution in horse	2 3 4	Post-Winter Vacation to Test examination
	4	**II (Practical)**	1. Study of soil microarthropods	4	August to Pre-Puja
			1. Identification of non-chordate museum specimens with reasons	15	Post-Puja to Winter vacation.
			1. Key making with specimens	15	Post-Winter Vacation to Test examination

Year	Paper	Unit	Topic	No. of lectures	Session
3 Hons (Syllabus 2016-1+1+1)	**5**	**II (Microbiology)**	1. Characterization & classification of bacteria 2. Microorganism culture techniques 3. Control of microorganisms 4. Cholera & Shigella	4 2 2 2	July to Pre-Puja
	6	**I**	1. Insect hormones	3	July to Pre-Puja
	6	**II (Applied Zoology)**	1. Sericulture 2. Apiculture 3. Integrated Pest management	4 4 2	July to Pre-Puja
	7	**(Practical)**	1. Gram staining 2. Determination of human blood group	4 2	July to Pre-Puja
	8	**(Practical)**	1. Demonstration of autoclave	2	July to Pre-Puja

Lesson Plan – Zoology General (2018-19)

Name: Dr. Patralekha Mukhopadhyay

Department: Zoology

Year	Course	Unit	Topic	No. of lectures	Session
1(Gen.) Sem I	**CC1-1-Th**	**2**	1. General characteristics of Porifera and classification up to classes 2. Canal System in Sycon	3 2	July to Pre-puja
		14	1. General features of Reptilia and classification up to orders 2. Poisonous & Non-poisonous snakes 3. Biting mechanism	2 2 2	
	CC1-1-P	**----**	1. Identification with reasons 2. Key for identification of poisonous & non-poisonous snakes 3. Digestive system & salivary gland of *Periplaneta* *4.* Mouth parts of *Periplaneta* *5.* Female reproductive system *Periplaneta* *6.* Preparation of Animal album	10 2 4 2 3 2	July up to 2nd wk of November
1(Gen) SEM II	**CC2-2-Th**	**6**	1. Gametogenesis 2. Fertilization in sea urchin 3. Eggs & egg membranes 4. Patterns of Cleavage 5. Fate maps & gastrulation 6. Fate of germ layers 7. Placenta types & functions	3 2 1 1 4 1 2	Post-winter recess
	CC2-2-P	**-----**	1.Osteology 2.Identification of chick embryo 3.Histological sections of different types of placenta	18 6 3	

Year	Paper	Group	Topic	No. of lectures	Session
2(Gen.) (Syllabus 2016-1+1+1)	**2**	**A (Functional anatomy of chordates)**	**1. <u>Respiratory structures and respiration:</u>** Gills of fish Lung & Air sacs of *Columba*	 3 3	August to Pre-Puja
		A (Functional anatomy of chordates)	1. **<u>Circulatory structure & Circulation</u>**: Single circuit heart in fish Double circuit heart in Amphibia Double circuit heart in mammals	 2 2 2	Post-Puja to Winter vacation
		A (Functional anatomy of chordates)	1. **<u>Nervous system</u>**: Brain in *Oreochromis* Origin & distribution of cranial nerves in fish	 2 1	Post-Winter Vacation to Test examination

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2 nd	III	II-A	**Concept of Ecosystem—structure and function, generalised model of energy flow in ecosystem** a) Introduction – Definition of Ecology and Environmental Biology – Why Scientists are giving much emphasis on the study of Ecology? – Concept of isolated, closed and open type of systems-ecosystem as an open system – Definition of Ecosystem b) Structural composition and functioning of an Ecosystem i) Abiotic factors-climatic regime, inorganic substances, organic substances. ii) Biotic factors – producers, consumers, decomposers iii) Trophic levels- producers, primary consumers, secondary consumers, tertiary consumers and top consumers. iv) Food chain – definition, types with examples, significance v) Food web – definition, example, significance vi) Comparison between food chain and food web. vii) Ecological pyramids-definition, description with examples, importance, type-pyramid of number, biomass and energy **2. Energy flow in the ecosystem** a) Concept of energy b) Source and different forms of energy in the ecosystem. c) Energy transfer in the ecosystem obey the laws of thermodynamics d) Concept of productivity - primary productivity -gross and net productivity - secondary productivity -gross and net productivity e) Lindeman's trophic dynamic concept to understand ecological efficiencies, types of ecological efficiencies f) Energy flow models – single channel and y-shaped model. g) Factors regulating amount of energy flow.	2 2	pre-puja

			2. Wetland as ecosystem service provider a. Definition—Ramsar site b. Classification and description c. Importance i)functions -ground water recharge and discharge - storage of water - storage of flood water - shoreline stabilization by soil erotion control. - nutrient retention and removal -retention and removal of pollutants - support for food chain - fisheries production ii) Values - Economic value - Conservation value - Aesthetic and recreational value - Natural heritage value 3. **Population attributes** a) Definition of population b) Aim of studying population ecology c) Properties of a population i) Population age structure ii) Distribution of population iii) Density and fluctuation in density –Dispersal and dispersion iv) Survivorship curves **4. Population growth models:** a) natality and mortality—definition, -- types and comparison between different types b) exponential and logistic growth forms—mathematical expressions and comparison c) Population density—definition, fluctuations in population density and its natural regulation, regulating factors-climatic (density independent) factors and biotic (density-dependent) factors, inverse	1 2 3	pre-puja pre puja

			density-dependent factors, Allee's growth factor 5. **Life history analysis**—Life tables and survivorship, r- and k- strategies and their comparison **6. Population interactions** a) Competition h) Definition and concept-- emergence of competition as a central theory, experiments of Tansley , Gause and Park, competion exclusion principle. ii) Types—interspecific and intraspecific competitions and their comparison, mathematical expression of competition and Lotka-Volterra model. **7. Community and ecosystem:** a) Definition and concept—assemblage, guild, habitat and niche concept, edge effect i)definition of habitat and niche ii) types of habitat-macro and micro, iii) types of niche – spatial, trophic, hypervolume or multidimensional iv) comparison between habitat and niche b) types-- i) depending on size-major, minor ii) Depending on climatic conditions - tundra, temperate, tropical iii) Depending on trophic status- produce, consumer (herbivore, carnivore, predator, prey, parasite) iv) Depending on successional stage-seral and climax community c) Characters-- i) structural -analytical (qualitative and quantitative and synthetic ii) functional -succession or community dynamics. **8. Ecological succession:** a) Definition b) Causes	2 4 3 6	Post puja to winter recess Post - puja to winter recess

			c) Process- nudation, invasion, competition and reaction, stabilization or climax. d) Important parameters of succession e) Trends of succession f) Types – primary, secondary, autogenic, allogenic, autotrophic, heterotrophic, induced, retrogressive, cycle. g) Concept of climax, types – cyclic climax, polyclimax, transient climax. h) Regulatory factors of succession -soil nutrients, moisture, slope, exposure to sunlight, grazing pressure etc. i) Examples – terrestrial (xerarch)) and aquatic (hydrarch) successions. j) Connell and Slatyer's model of succession and Tilman's resource-ratio hypothesis. **9. Animal's space and resource use:** a) Resource partitioning i)Concept of resource ii)Resource partitioning -competition hypothesis, niche overlapping, niche shift, Gause's exclusion principle, limiting similarity, co-existance. iii) Coupled oscillation of Predator and prey population—modelling. **10. Brief idea on El-nino, La-nino and their consequences.** i) El-nino: causes and consequences ii) La-nino: : causes and consequences iii) Comparison between two	3 2	
2nd 2nd	III IV	II-B I-A	**1. Origin and propagation of nerve impulse through nerves, synaptic and neuromuscular junctions, functional significance of giant nerve fibres in molluscs.** a) Propagation of nerve impulse through nerves—resting membrane potential, Na-K pump, Action potential, Conduction of impulse through myelinated and non-myelinated nerves, all or none law, factors affecting conduction. b) Synaptic transmission—mechanism of physical and chemical changes during transmission, neurotransmitters and receptors.	6	Post winter to test

			c) Neuromuscular junctions-- mechanism of physical and chemical changes during transmission, neurotransmitters and receptors. d) Comparison between synaptic and neuromuscular transmission.		
2nd	IV	II (Practical)	**1. General discussion on distinguishing characters and classification of chordates. Scheme of chordate classification .** **2. Identification (systematic position up to sub class) of the following animals :** *Branchiostoma, Ascidia, Petromyzon, Myxine, Torpedo, Sphyrna, Hippocampus, Mystus, Necturus, Ichthyophis, Tylototriton, Cryptobranchus, Hyla, Chameleon ,Gekko,Vipera, Calotes, Mabuya, Varanus, Naja, Hydrophis*, Mega Chiroptera. **1. Study of aquatic community (microarthropod)**	1 6 2	pre - Puja
			2. Use of pH meter for estimation of pH of soil and water sample **3. Zooplankton count by standard methods.** **Practical copy check before test** **Practice classes and practical copy check**	4 8 4 16	Post puja to winter recess Post winter to test Post test to summer recess

3rd	VI	II	**1. Concept of Ecosystem** a) Introduction – Definition of Ecology and Environmental Biology – Why Scientists are giving much emphasis on the study of Ecology? – Concept of isolated, closed and open type of systems-ecosystem as an open system – Definition of Ecosystem b) Structural composition and functioning of an Ecosystem i) Abiotic factors-climatic regime, inorganic substances, organic substances. ii) Biotic factors – producers, consumers, decomposers iii) Trophic levels- producers, primary consumers, secondary consumers, tertiary consumers and top consumers. iv) Food chain – definition, types with examples, significance v) Food web – definition, example, significance vi) Comparison between food chain and food web. vii) Ecological pyramids-definition, description with examples, importance, type-pyramid of number, biomass and energy.	3	pre - Puja
3rd	VI	Ii	**2. Energy flow in the ecosystem** i) Concept of energy ii) Source and different forms of energy in the ecosystem. iii) Energy transfer in the ecosystem obey the laws of thermodynamics iv) Concept of productivity - primary productivity -gross and net productivity - secondary productivity -gross and net productivity v) Lindeman's trophic dynamic concept to understand ecological efficiencies, types of ecological efficiencies	4	pre - Puja

			vi) Energy flow models – single channel and y-shaped model. vii) Factors regulating amount of energy flow. **3. Wetland as ecosystem service provider** d. Definition—Ramsar site e. Classification and description f. Importance i)functions -ground water recharge and discharge - storage of water - storage of flood water - shoreline stabilization by soil erotion control. - nutrient retention and removal -retention and removal of pollutants - support for food chain - fisheries production ii) Values - Economic value - Conservation value - Aesthetic and recreational value - Natural heritage value. 4. **Population ecology:** a) Definition of population b) Aim of studying population ecology c) Properties of a population i) Population age structure ii) Distribution of population iii) Density and fluctuation in density –Dispersal and dispersion iv) Survivorship curves d) Population growth models: i) natality and mortality—definition, -- types and comparison between different types ii) exponential and logistic growth forms—mathematical expressions and comparison iii) Population density—definition, fluctuations in population density and its natural regulation, regulating factors-climatic (density independent) factors and biotic (density-dependent) factors, inverse density-dependent factors, Allee's growth factor	2 6	pre - Puja

3rd	VI	II	**5. Community ecology:** a) Definition and concept—assamblage, guild, edge effect b) types-- i) depending on size-major, minor ii) Depending on climatic conditions - tundra, temperate, tropical iii) Depending on trophic status- produce, consumer (herbivore, carnivore, predator, prey, parasite) iv) Depending on successional stage-seral and climax community c) Characters i) structural -analytical (qualitative and quantitative and synthetic ii) functional -succession or community dynamics d) habitat and niche concept i)definition of habitat and niche ii) types of habitat-macro and micro, iii) types of niche – spatial, trophic, hypervolume or multidimensional iv) comparison between habitat and niche e) Resource partitioning i)Concept of resource ii)Resource partitioning -competition hypothesis, niche overlapping, niche shift, Gause's exclusion principle, limiting similarity, co-existance.	6	
3rd	VI	II	**6. Environmental factors—** a) Definition b) Regulating factors i) Abiotic—climatic factors like light and temperature andb their effects on organisms ii) Biotic—Intra and interspecific associations. **7. Ecological succession:** a) Definition b) Causes c) Process- nudation, invasion, competition and reaction, stabilization or climax. d) Important parameters of succession e) Trends of succession	3 6	Post puja to test

			f) Types – primary, secondary, autogenic, allogenic, autotrophic, heterotrophic, induced, retrogressive, cycle. g) Concept of climax, types – cyclic climax, polyclimax, transient climax. h) Regulatory factors of succession -soil nutrients, moisture, slope, exposure to sunlight, grazing pressure etc. i) Examples – terrestrial (xerarch)) and aquatic (hydrarch) successions. j) Animal's space and resource use: a) Resource partitioning i)Concept of resource ii)Resource partitioning -competition hypothesis, niche overlapping, niche shift, Gause's exclusion principle, limiting similarity, co-existance. **8. Biodiversity:** a) Concept – Definition, explanation and extent of biodiversity b) Type—– i) according to extent-- genetic diversity, species diversity, ecosystem diversity and agro-biodiversity ii) according to geographical scale – alpha, beta and gamma diversity. c) biodiversity and human welfare i) Anthropocentric values of biodiversity- sources of food, wood, clothing, medicine and also have recreational and educational values ii) Ecosystem -oriented values- restriction of pollution, prevention of soil erosion, protection of watershed, crop protection, protection from adverse condition, maintenance of ecosystem stability iii) National heritage value – enrichment of aesthetic senses and culture.	4	Post puja to test
3rd	VII	I	**1. Aquaculture :** a. Fisheries Resources of India b. Induced breeding and seed production of carps c. Polyculture of fin fish	8	Post puja to test

			d. Exotic fishes and their role e. Fish diseases, symptoms and control f. Fresh water and brakish water prawn culture g. Fish byproducts and their uses h. Pearl culture.		
3rd	VIII	I (Practical)	**1. Identification and comment on their economic importance of the following animals :** *Penaeus sp., Macrobrachium sp., Labeo rohita, Labeo bata, Cirrhinus mrigala, Mugil parsia, Lates calcarifer* **2. Study of aquatic community (microarthropod)** **3. Use of pH meter for estimation of pH of soil and water sample.** **Practical copy check and practice classes**	6 2 4 4	pre-puja
3rd	VIII	II (Practical)	**1. Identification (systematic position up to class and specimen characters only) of the following animals :** *Scypha* sp., Neptune's cup, *Aurelia* sp., *Pennatula* sp., Sea anemone, *Beroe* sp., *Madrepora* sp. 2. **Identification (systematic position up to class and specimen characters only) of the following animals :** *Branchiostoma, Ascidia, Petromyzon, Myxine, Torpedo, Sphyrna, Hippocampus, Ichthyophis, Tylototriton, Axolotl, Cryptobranchus, Hyla.* **Practical copy check**	4 6 2	Post puja to test

			ii) Depending on climatic conditions -tundra, temperate, tropical iii) Depending on trophic status- produce, consumer (herbivore, carnivore, predator, prey, parasite) v) Depending on successional stage-seral and climax community.		
2nd	II	Gr.-C (ZG-06)	**3.** a) **Nerve impulse propagation**— resting membrane potential and action potential, shifting of action potential. b) Synaptic transmission—structural description of synapse and mechanism of synaptic transmission.	5	Post puja to winter recess
2nd	III (practical)	Course no. ZG-07	**1. Major dissection:** Digestive , nervous and female reproductive system of Cockroach	12	pre puja
			2. Mounting and preparation: a) Mouth parts of Cockroach b) Haemolymph of Cockroach with staining c) Whole-mount of aquatic and soil microarthropods d) Epithelial cells from buccal smear with staining.	18 06	Post puja to winter recess Post winter to test
3rd	IV		**3. Identification:** *a)* Bones: Skull, vertebrae, limb and girdle bones of *Columba* b) Histological slides: Section of mammalian liver, pancreas, testis, ovary and thyroid.	08	pre puja
			1. Aquaculture: a) Principles, definition and scope, Fisheries resources of India(inland and off-shore) and their important ichthyofauna b) Exotic fishes—their merits and demerits c) Basic principles of different aquaculture systems (polyculture and integrated farming)		

			d) Marine pearl culture—sites, species involved and processes. e) Prawn and shrimp culture—sites, species involved and processes. 2. **Lac culture**—Host plants and life cycle of the insect, sites of culture, harvesting of crop, collection and processing of lac, uses	2 4	Post puja to test

LESSON PLAN FOR 2nd YEAR (HONS.) THEORY Concerned Teacher: Dr. Debjani Das (Ghosh) (Asst. Prof.) Session -2018-19

Paper , Unit and Group	**Item Or Chapter**	**Topic**	**No. of lectures**	**Session**
4, I, & A	Animal Physiology	1. Physiology of osmo-regulation in vertebrates	4	Sept. to Pre-Puja
		2. Temperature regulation in cold desert	2	Do
4, I & B	Biochemistry	3. Enzymes-Classes, Kinetics and factors affecting enzyme action, enzyme inhibition	8	Post-Puja to pre Winter vacation
		4. Types of Biodiversity, Biodiversity in human welfare, mega diversity zones and biodiversity hot spots with special reference to India	6	Do
3, 2 & B	**Biodiversity and Conservation**	5. Concept of threatened fauna-IUCN categories	2	Do
		6. Concept of wildlife, wildlife heritage of India, reasons for wildlife depletion in Indian context	4	Do
		7. Protected area concept-Sanctuary, National Park, Biosphere reserve, core zone, buffer zone, corridor concept. Conservation reserves.	4	Post-Winter Vacation to Test examination
		8. JFM and Arabari model for conservation-key stone, flagship and umbrella species	2	Do
		9. Special management program with special reference to Tiger project	4	Do
		10. Man-animal conflict (Man-tiger and Man-elephant) –causes and concern	4	Do

LESSON PLAN FOR 2nd YEAR (HONS.) PRACTICAL
Concerned Teacher: Dr. Debjani Das (Ghosh) (Asst. Prof.)

Paper, Unit & Group	Item Or Chapter	Topic	No. of Classes	Session
IV-II (1stTerm)	Ecological methods	1. Determination of dissolved O_2, free CO_2 of water	3x7	Sept. -Pre winter vacation
IV-II, B (2nd Term)	Animal Physiology and Biochemistry	2. Counting of cockroach haemocytes using haemocytometer 3. Quantitative estimation of protein by modified Lowry's colorimetric method.	3x4 3x8	Post winter vacation till Test exam

LESSON PLAN FOR 3RD YEAR (HONS.) THEORY
Concerned Teacher: Dr. Debjani Das (Ghosh) (Asst. Prof.)

Paper V, Unit-I, Group-B & C of 3rd Year (Hons.) theory syllabus involves mainly **Parasitology & Immunology.** Humans have suffered greatly through the centuries because of parasites. Malaria have sent untold millions to their graves. Even today after successful campaigns against malaria still are prevalent in the world. Parasitic diseases as Leishmaniasis, Ascariasis, malaria are the prime killers of humans. Serious infections occur in tropical regions, particularly in less-developed countries, so most dwellers within tropical, industrialized regions are unaware of the magnitude of the problem. Parasites are also responsible for staggering financial loss. Malaria, for example, is usually chronic, debilitating, periodically disabling disease. Parasitologists have a unique opportunity to break the deadly cycle by contributing to the global eradication of communicable diseases while making possible more efficient use of the earth's resources.

Chapter 3-5 deals with the definition along with detail understanding of the terms of animal association: Symbiosis, commensalisms, mutualism & parasitism, life cycle, pathogenecity, clinical features & control of a) Plasmodium sp. b) Entamoeba histolytica, c) Leishmania donovani, d) Wuchereria bancrofti, e) Fasciola sp., f) Ascaris sp. It covers with understanding of zoonosis: zoonotic aspect of common helminth diseases along with most revealing topic about host-parasite interaction & its molecular basis with reference to protozoan & helminthic diseases.

We live in a hostile world filled with many infectious agents. Immunology grew out of the study of infectious diseases and body's responses towards them.

Immunology is the complex sequence of events, triggered by the introduction of an antigen and subsequent elimination of it. In the late eighteenth century it emerged as a scientific discipline when vaccination was discovered- a mechanism of rendering protection against pathogens. This part deals directly with human health and well being so understanding the immune system-its development, functions and malfunctions, thereby causing disease is facilitated through the **Chapter 6-11** in **Group-C** as cells and organs of immune system, types of immunity, characteristics features, types, antigenic determinants, processing and presentation of Antigens. It also includes immunoglobulin classification, structures, binding sites along with poly- and

monoclonal antibodies. Basic understanding about cytokine, adjuvant & complement is overviewed. An insight is provided regarding B-cell generation, activation and differentiation, T-cell maturation and activation along with the concept of T & B cell co-operation, types and roles of macrophage. A comprehensive understanding is provided to the students accompanied by power point presentation, artwork with a concise and structural style of presentation in order to ensure basic understanding of the subject and educates not intimidates or overwhelms them.
Paper-VII, Unit-I, Group-B includes **Biostatistics** which includes application of statistical methodology to collect, analyze and interpretation of data (derived from biological sciences) in order to measure central tendencies as mean, median, mode.

Paper ,Unit & Group	**Course No.**	**Item Or Chapter**	**Topic**	**No. of lectures**	**Session**
V-I,B	ZHT-09	Microbiology ,Parasitology & Immunology	1. Animal association: Symbiosis, commensalisms, mutualism, parasitism and zoonosis.	4	July to Pre-Puja
			2. Life cycle, pathogenecity, clinical features & control of a) Plasmodium sp. b) Entamoeba histolytica, c) Leishmania donovani, d) Wuchereria bancrofti, e) Fasciola sp. f) Ascaris sp.	12	July to Pre-Puja and Post-Puja to Winter vacation
			3. Vector biology: mosquito and ticks.	4	Do
V-I,B	ZHT-09	Microbiology ,Parasitology & Immunology	4. Cells and organs of immune system, innate and adaptive immunity.	5	Post-Winter Vacation to Test examination
			5. Antigens: characteristics, antigenic determinants, antigen processing and presentation.	2	Do
			6. Antibody: Structure, classes, binding site, polyclonal and monoclonal antibodies.	4	Do
			7. Cytokines, adjuvant & complements.	4	Do
			8. B cell generation, activation and differentiation, co-operation, macrophage.	4	Do
			6. T cell maturation and activation.	5	Do
VII-I,B	ZHT-13	Biostatistics	Mean, Median and Mode	6	Post-Winter Vacation to Test examination

LESSON PLAN FOR 2nd YEAR (Gen) THEORY
Concerned Teacher : Dr. Debjani Das (Ghosh) (Asst. Prof.)

Paper II, Group-B of 2ND Year (Gen.) theory syllabus involves **Ecology, Animal Behavior, Biodiversity and Wildlife.** Chapter -4 comprises of Honey bees-their castes, hive and their roles. Chapter-5 involves conservation of wild life: its purpose, methods, concept of Biosphere Reserve. It also provides insights regarding importance, strategies of wildlife conservation, conservation act and its application, basic concepts about National park and wildlife sanctuary. Understanding towards animal cruelty and prevention act is also discussed in a clear and lucid manner.

Group-C comprises of **Histology, Endocrinology, Animal Physiology and Biochemistry.** Chapter -1 deals with general characters of hormones, its naming and function along with hormones secreted from Pituitary.

And in Chapter-3, the answers related to enzymes: classes, kinetics & factors affecting enzymatic actions are provided in a precise and comprehensive manner so as to provide a basic understanding to the students.

Paper &Group	**Course No.**	**Item Or Chapter**	**Topic**	**No. of lectures**	**Session**
II-C 1st Term	ZG-06	Histology, Endocrinology, Animal Physiology & Biochemistry	3. General characters of Hormones, Naming and function of hormones secreted from pituitary. 4. Enzymes: classes, and characteristics, mechanism of enzymatic action, effects on enzymatic action (pH and temperature).	6 5	Sept. to Pre winter vacation
II-B 2nd Term	ZG-05	Ecology, Animal Behavior, Biodiversity and Wildlife	1. Honey bee-castes, hive and their roles. 2. Conservation of wild life: its purpose, methods, concept of Biosphere Reserve, its importance, strategies of wildlife conservation, conservation act and its application, National park and wildlife sanctuary	6 8	Post winter vacation till Test exam

LESSON PLAN FOR 2nd YEAR (Gen) Practical

Concerned Teacher : Dr. Debjani Das (Ghosh) (Asst. Prof.)

Paper	Course No.	Item Or Chapter	Topic	No. of classes	Session
III	ZG-09	Laboratory course-1	1.**Demonstration**: i. Cockroach- digestive and nervous & female reproductive systems.	2x9	Sept.-Pre winter vacation
III	ZG-01	Laboratory course-1	2. **Mounting & Preparation**: i. Mouth parts of cockroach. ii. Haemolymph of cockroach. iii. Gut contents of cockroach iv. Whole mount of aquatic and soil micro-arthropods. v. Epithelial cells from buccal smears. 3.B. **Identifications with reasons**: a. Bones: Skull, vertebrae, limb & girdle bones of *Columba*. b. Histological slides: T.S of ovary, testis, thyroid, pancreas, liver.	2x 2 2x2 2x4 2x2 2x2 2x4 2x2	Post winter vacation till final exam Do Do Do

LESSON PLAN FOR 3RD YEAR (Gen) THEORY

Concerned Teacher: Dr. Debjani Das (Ghosh) (Asst. Prof.)

Paper IV-A of 3RD Year (Gen) theory concerned with **Applied Zoology**. This portion of the General syllabus is incorporated keeping in mind so that General Students can be aware of the immense importance of Zoology in revenue earning.

Chapter 1, involves Lac culture, including Lac insects, composition of lac, strains of lac insect, cultivation of lac, lac host plants, processing of lac and its uses.

Chapter 2 deals with Parasitology and Immunology which includes parasitism and other inter-specific interactions. Life history, pathogenecity and clinical features of certain parasites,

Chapter 3, revolves in the outline structure, classification of Immunoglobulin, antigen-antibody reaction along with basic principle of vaccination.

Paper &Group	Course No.	Item Or Chapter	Topic	No. of lectures	Session
IV-A	ZG-08	Applied Zoology	1. Lac culture: Lac insects, composition of lac, strains of lac insect, cultivation of lac, lac host plants, processing of lac and its uses.	6	July-Sept.

IV-B	ZG-09	Parasitology & Immunology	2. Parasitism and other interspecific (Symbiosis, commensalism, mutualism) interactions. 3. Life history, pathogenecity and clinical features of : i. *Entamoeba histolytica, Plasmodium vivax, Plasmodium falciparum, Ascaris* sp.*, Fasciola hepatica.* 4. Biotechnology & Immunology: outline structure and classification of Immunoglobulin, antigen-antibody reaction, basic principle of vaccination.	3 8 5	Sept.-till pre winter vacation Do Post winter vacation till Test exam

SUMALLYA KARMAKAR
ASSISTANT PROFESSOR, DEPT OF ZOOLOGY

Year	Paper	Unit	Group	Topic	No. of lectures	Session
2 Hons	**3**	**1**	C	1. Communication in Honey bees	02	**Pre-Puja**
		1	C	1. Instinctive & learning behavior, fixed action pattern.	03	**post-Puja to Winter recess**
			B	2. Altruism, kinship and selfishness	02	
				3. Natural selection, Synthetic theory. Concept of selection: stabilizing, directional and disruptive with example	04	
			A	4. Basic principle & use of DNA bar coding in species identification.	02 02	
			C	5. Echolocation in bat	02	
				6. Parental investment (fish only)	02	
				7. Bird Migration	02	
			B	1. Hardy-Weinberg equilibrium	02	**post-Winter recess to Test examination**
				2. Genetic Drift, Founder effect and Population Bottleneck	02	
	4	**2**	(Prac)	1. Zoo-plankton count by standard methods	04	**post-Winter recess to Test examination**
				2. Preparation of Normal, molar and standard solutions, phosphate buffers, serial dilutions	04	

Year	Paper	Unit	Group	Topic	No. of lectures	Session
3 Hons	**5**	**2**	**A**	1. Gene and cistorn concept: One gene one polypeptide, (sickle cell anemia, Thalassemia) 2. Split gene, RNA splicing and Editing 3. Genetics of cell cycle. 4. Cancer: types, causes- genetic and others 5. Repair mechanism, direct reversal repair, Excision repair, Mismatch repair, Repair defects and human diseases	04 05 04 04 04	**July to Pre-Puja**
	6 **5**	**1** **2**	**A**	1. Concept of evolution: Emergence of evolutionary thoughts a. Variation and sources of variation in a population b. Forces altering Hardy-Weinberg equilibrium, calculating allele & genotype frequency (multiple allele, sex linked excluded), (non random mating, mutation, migration, genetic drift and natural selection), Founder effect and population bottleneck c. Genetic diversity and phylogenetic analysis 2. Regulation of gene expression: *lac* and *trp* operons, epigenetic regulation 3. Elementary idea of Repetative DNA, Transposable genetic element, LINES, SINES, Alu 4. Benzer's RII locus (idea of complementation and non-complementation)	06 06 03 03	**post-Puja to Test examination**
	8	**1**	(Prac)	1. Chi-Square test and t-test	12	**July to Pre-Puja**
				1. DNA isolation from goat liver	04	**post-Puja to Test examination**

Year	Paper	Group	Topic	No. of lectures	Session
2 Gen	**2**	C	1. Osmoconformers and Osmoregulators – definition and example: Osmoregulation in fishes	04	**Pre-Puja to Winter recess**
		C	1. Histology of pancreas	02	**post-Winter recess to Test examination**

Year	Paper	Group	Topic	No. of lectures	Session
3 Gen		C	1. Anatomical and Physiological adaptations: Aquatic, Desert and Volant animals 2. Zoogeographical realms & their subdivisions with characteristic fauna	03 03	**July to Pre-Puja**
		C	1. Hardy-Weinberg equilibrium in relation to natural selection- a brief idea	04	**post-Puja to Test examination**
	7	D (Prac)	1. Estimation of dissolved O_2 content of water. 2. Estimation of free CO_2 content of water 3. Measurement of water pH and handling of pH meter	04 04 04	**July to Pre-Puja**
			1. Pedigree analysis: sex linked recessive, autosomal recessive and dominant. 2. Identification and economic importance of the following: *Sitophilus sp, Apion sp, Leptocorisa sp, Scirpophaga sp, Hispa sp, Leucinodes sp, Bandicota sp,* silkworm life history stages, members of bee colony, members of termite colony, lac insect, *Culex, Anopheles, Ades, Penaeus sp, Macrobrachium sp, Labeo rohita, Labeo bata, Cirrhinus mrigala, Mugil parsia, Lates calcarifers*	02 02	**post-Puja to Test examination**

Lesson Plan- Zoology 2018-2019

Name – Mrs. Suchona Mitra Chakraborty

Semester	Programme	Course and Name of the paper	Topic	Teacher	No. Of hours
1	Hons	CC1 Non-chordates (Theory)	1. General characterestics and classification up to phylum Locomotion in Eugelna. Paramoecium and amoeba: Conjugation in Paramoecium. 2. General characterestics and classification. Life cycle, and Pathogencity and control measures of Ascaris lumbricoides and Wuchereria bancrofti. Parastic adaptationsin helminthes.	SC	10 7

		CC2 Molecular biology (Theory)	1. Types of DNA repair mechanisms, RecBCD model in prakaryotes ,nucleotide and base excision repair, SOS repair4. PCR, western and sourthern blot, northern blot 2. PCR, western and sourthern blot, northern blot	"	2 3
	Gen	CC1/GE Animal diversity (Theory)	1.Protochordates 2. Amphibia 3. Mammals	"	2 4 4

			CC1/GE (Pract)	1. Identification of-*Amoeba, Euglena, Paramoecium, Sycon, Obelia, Aurelia, Metridium, Taenia, Ascaris, Aphrodite, Neris, Hirudinaria, Palaemon,Cancer, Limulus, Apis, Chiton, Dentalium, Unio, Sepia, Octopus* 2. Study of anatomy of – Mouth parts, female reproductive system of cockroach 3. Preparation of Animal Album	"	14 12 4
Year	**Paper**	**Unit**	**Group**	**Topic**	**No. of lectures**	**Session**
II (Hons)	3	I	B	i)RNA world and origin of life(chemical origin) ii)Bathymetric and discontinuous distribution iii)Barrier and dispersal..types and their effect on animal distribution	3	July to pre puja

II (Hons)	3	I	B	i)Barrier & dispersal … types & their impact on animal distribution ii)Zoogeographical realm..names, animal distribution, Avian and mammalian fauna in different realms iii)Role of NGOs in wildlife conservation in India	3 3 1	Post puja to winter vacation
		II	B	iii)Environmental audit and impact assessment	2	Post puja to winter vacation
	4	I	A	iv)Physiology of excretion..urine formation, urea cycle, nitrogenous waste	4	
			B	v) Carbohydrate metabolism.. glycogenesis, glycogenolysis, neoglucogenesis	4	Post puja to winter vacation

				v)Beta oxidation of fatty acid.. Palmatic & Linoleic acid ii)Integration of Krebs cycle,oxidative phosphorylation ,& ETC iii)Nucleic acid metabolism..Purine salvage pathway	3 3 3	Post winter to test exam
		II		Qualitative test for i)carbohydrate (starch, maltose, fructose, glucose)	6	July to pre puja
				ii)protein(albumin, gelatin, peptone) iii)fat iv)uric-acid v)urea	3	Post puja to winter vacation
III (Hons)	5	II	B	1)i.Gene cloning technique ii.cDNA library iii.PCR 2)DNA polymorphism … RFLP,RAPD,VNTR DNA fingerprint 3)Medical & forensic biotechnology	3	July to pre puja

	6	I	A	i)Origin of life(chemical) ii)Barrier, dispersal & their impact on animal distribution iii) Zoogeography	2	
III (Hons)			B	i)Instinctive & learned behavior ii)FAP iii)Communication in honey bees(dance & pheromones) iv)Parental care in fish, Parent offspring conflict	2 3	Post puja to winter vacation
	6	II	B	i)Management of wildlife … conservation areas & their role,..reduction of man animal conflict ii)Biomonitering of environment iii) EIA	2	Post puja to winter vacation
	7	I	A	i)Environmental toxicology … LD 50, LC50, chronic & acute toxicity	2	Post puja to winter vacation
			B	i)Biostatistics… corelation	2	Post winter to test exam
	8	I		i)Determination of dissolved O2 of water	6	July to pre puja

				i)Determination of dissolved free carbondioxide of water	5	Post puja to winter vacation

Lesson Plan- Zoology 2018-2019

Name – Mrs. Suchona Mitra Chakraborty

Year	Paper	Group	Topic	No. of lectures	Session
II	2	A	i)Classification of phylum chordate with features ii)Classification Amphibia(upto Subclass) Reptilia & mammalia	2 1 3	July to pre puja
			i)Classification of Fishes & Aves ii)Structure & function of scale in fish	4 2	Post puja to winter vacation
			i)Structure & function of feather	2	Post winter to test exam
			ii)Pharynx of *Branchiostoma* iii)Stomach of *Bos*	2 2	Post winter to test exam