

Department of Zoology, Basirhat College

Session-2017-2018

Lesson Plan

Lesson Plan for: Part I (Paper 1 and 2).

- Course Outcome:
 - CO1: Understand the general characteristics of Protists, Parazoa, and Metazoan phyla up to nemathelminthes, and can classify them up to class.
 - CO2: Critically analyse the organisation, special characteristics, and life cycle traits of some selected animals from phylum porifera to nemathelminthes.
 - CO3: Understand the evolutionary significance of symmetry, segmentation of Metazoa and parasitism in helminths.
 - CO4: Able to appreciate the importance of conservation through the study of formation and degradation of coral reefs around the world.
 - CO5: Can identify organisms of the above-mentioned taxa by inspecting through microscope or naked eye.

Course planner:

Academic year 2017-18	Course Module	Teacher	Class-hour	Remarks*
JULY, 2017 to 25 th sept. Sep	Module ZH101: Living kingdoms and protozoans 1. Introduction to the modern classification of living organisms into Kingdoms, magnitude of diversity of living organisms: estimated species richness 2. Introduction to the Kingdom Protozoa: Classifications (up to Phylum only) and examples; Special topics (brief outlines only): contractile vacuoles, structures of cilia, reproduction in Paramecium.	RS	19 hr	Classroom teaching
	2. Special topics to understand the diversity of non-chordate structures and functions: 2.1 Body planes and symmetries, coelom, deuterostome vs protostome (only preliminary conceptual outlines) 2.2 Polymorphisms in Cnidaria 2.3 Coral reef: types, formation, distribution, conservation significance 2.4 Torsions in Gastropods 2.5 Cyclomorphosis in Rotifers 2.6 Excretion in invertebrates with special reference to flame cells, nephridia, coelomoducts and malpighian tubules 2.7 Gas exchange by gills and trachea in	SP	8 hr	Classroom teaching

	Arthropods 2.8 Water vascular system and haemal system in Echinoderms 2.9 Brief overview of invertebrate larval forms			
	1. Chordate Classifications: (up to orders with salient features and examples, except for birds and mammals only names and examples of the orders) 2. Chordates: special topics reflecting diversity of adaptations. 2.1 Feeding in Cephalochordates and Urochordates 2.2 Larval form and metamorphosis in Ascidians 2.3 Experimental analysis of function of a vertebrate structure: study of feeding strike of a venomous snake	CG	14	Classroom teaching
	2.4 Biting, venom delivery and feeding in snakes 2.5 General features of vertebrate integument and its specialization with reference to exoskeletons 2.6 Evolution of aortic arches in vertebrates 2.7 Evolutionary trend in vertebrate brains 2.8 Tripartite concept of kidney organization 2.9 Ruminant stomachs- Digestive tract specializations as fermentation chambers in herbivore mammals 2.10 Dentitions in vertebrates 2.11 Vertebrae: different types	KK	10	Classroom teaching
26 th Sept to 21 st Oct Puja vacation.				
NOV, 2017 to 15 th MAY, 2018.	Animal Behaviour: 1. Tinbergen's four questions on studying animal behaviour; 2. Definitions and examples of- habituation, instinctive behaviour, FAP, imprinting and other programmed learning, cultural transmission 3. Social animals- advantages and disadvantages of living in a group, examples of social animals and outline of their social structures 4. Definition and examples of altruism, eusociality, units of selection	SP	10	Classroom teaching
	Module ZH201: Evolution 1. Rise of evolutionary theories: the historical outline- conflict between creationists' idea and	SM	15	Classroom teaching

	<p>evolutionary theories, Lamark's theory, Theories proposed by Darwin and Wallace, modern form of Darwinian theory including modern synthesis</p> <p>2. H-W theorem and its significance in evolutionary theory, calculating gene frequencies for H-W and non-H-W populations (very simple problems only), Variations in natural populations.</p> <p>3. Nature and actions of natural selection – evolution of industrial melanism in Biston betularia as example,</p> <p>4. Genetic Drift, Gene Flow and Mutation Rate (only definitions and outlines of these processes, details of nature of actions by each, mathematical models not necessary)</p>			
	<p>5. Critical concepts (only preliminary and brief discussions)-</p> <p>5.1 Application of the concept of adaptation-precise definition of adaptation in evolutionary sense, critique of 'adaptationist program'</p> <p>5.2 Trends in the evolution of modern horses-outlines only</p> <p>5.3 Measurement of rates of evolution – with the example of equine teeth including allometry</p> <p>5.4 Punctuationist vs. gradualist mode of evolutionary changes</p> <p>5.5 Heterochrony – as a process of macroevolution, just definitions of the heterochronic processes and examples, including Neoteny and Progenesis</p> <p>5.6 Process of speciation: concept of reproductively isolated species and models of speciation- Allopatric, Sympatric and Parapatric models.</p> <p>5.7 Recent knowledge about hominid evolution: a brief outline</p>	KK	13	Classroom teaching

	Module ZH202: Preliminary knowledge for quantification in biology: 1. Logarithm, Matrices, Permutation and Combination, Probabilities (just preliminary concepts and very simple problems to be worked out) 2. Graphical representation of data- bar chart, histograms, scatter plots, pie charts; Discrete and Continuous variables-examples, Normal distribution (only primary characteristics and examples, detailed mathematical characterizations not required); Mean, Mode and Median, Standard deviation, Variance and Standard error; Simple Correlations; concept of Hypothesis Testing, Tests for goodness of fit- Chi-square, Student t-test for comparing means of two small samples from normal populations.	CG & RS	14 7	Classroom teaching
	End of part 1	Total classes: 110		

Resources:

- Pechenik, J.A., Biology of Invertebrates, TMH, 2002;
- Kardong, K. V., Vertebrates, 3rd ed., TMH ed.2002
- Taylor, Green and Stout, Biological Sciences Cambridge LPE
- Manning, A. and M. S. Dawkins, M.S., An Introduction to Animal Behaviour, Cambridge Univ. Press, Indian Ed.
- Ridley, Mark, Evolution, Blackwell, 2nd Ed., 1999

*Remarks will specify

- The nature of the class-topic (viz. Theoretical, Practical, and Tutorial).
- Methodology of teaching (whether using ICT, engaging students in group discussion, quiz etc. etc.)
- Different modes of assessment. (Please check UGC evaluation reforms).

Lesson Plan for: Part II (Paper 4 and 5).

- Course Outcome:
- **CO1:** The basic objective of the paper 4 & 5 is to deliver the information to students on parasite and host with emphasis on morphology, life cycle, prevalence, epidemiology, pathogenicity, diagnosis, prophylaxis and treatment.
- **CO2:** help to understand the life cycle stages of different parasites from different group.
- **CO3:** Students learn the concepts of host parasite interaction.
- **CO4:** Students also learn about ectoparasite and myiasis and zoonosis.

Course planner:

Academic year 2017-18	Course Module	Teacher	Class-hour	Remarks*
JULY, 2017 to 25 th sept.	Module 401: Genetics Significance of Mendel's experiments and laws, Concepts and examples of -Test Cross and Back Cross, Incomplete Dominance/Codominance, Multiple Alleles, Epistasis, Polygenic inheritance Chromosomal aberrations, gene mutations and human diseases (Down's, Klienfelter's, Turner's, Cri du Chat, Sickle cell, Haemophilia, Thallassimia, Albinism – only genetical aspects here, details of physiological consequences not required), Sex chromosomes and sex-linked inheritance Linkage and Recombination – Types and outcome, linkage disequilibrium, 3-point cross.	RS	9 hr	Classroom teaching
	Module 402: Cell Biology and Molecular Biology (30) 1. Units of biological measurements and microscopy 2. Plasma membrane : lipid bilayer, membrane proteins and membrane transport - brief outline only 3. Other organelles : introduction to structure and functions of mitochondria, GERL 4. Cell Cycle : preliminary concept 5. Replication: only outline of the mechanisms 6. Transcription: only outline of the mechanisms	SP	12 hr	Classroom teaching
	Module 403: Biochemistry 1. Chemical evolution of biomolecules (outline only) 2. Biological significance of water 3. Structural identities of biomolecules : Carbohydrates, Amino Acids, Peptides, Lipids (preliminary outlines of lipids), nucleic acids.	CG	7	

	Module 404: Biophysics (20) <ol style="list-style-type: none"> 1. Three-dimensional structure of proteins (preliminary concepts only) : peptide bonds, alpha helix, beta conformation, common examples of globular proteins 2. Structure of nucleic acids (preliminary concepts only) : DNA and RNAs 	KK	8	
26th Sept to 21st Oct Puja vacation.				
NOV, 2017 to 15 th MAY, 2018.	501: Taxonomy and Systematics (10) <ol style="list-style-type: none"> 1. Modern definitions of taxonomy and systematics, philosophy and working of modern taxonomy, Linaean hierarchy, 2. Concept of a species in taxonomic practice 3. ICZN and its important rules, 4. Cladistics: simple introductory concept and examples. 	SP	8	
	Microbiology <ul style="list-style-type: none"> • The study of microbial structure • Microbial Nutrition, Microbial growth • Control of Microorganisms by Physical and Chemical agents • Pathogenicity of Microorganisms • Human diseases caused by Virus (polio, avine influenza) Bacteria (cholera, tuberculosis), Fungi (ringworm) 	SM	15	
	Parasitology <ol style="list-style-type: none"> 1. Concept of parasitism 2. Origin and evolution of parasitism, host parasitic interactions, 3. Parasitic adaptation: physiological, bio-chemical, Zoonosis, Myasis 4. Identifying characters, life cycles, mode of infections of important parasites – <i>Entamoeba</i>, <i>Giardia</i>, <i>Fasciola</i>, <i>Taenia</i>, <i>Ascaris</i> 	KK	13	
	<ol style="list-style-type: none"> 1. Translation : only outline of the mechanisms 2. Gene expression-lac operon, trp operon (only introductory outline of the processes) 3. Types of mutations 4. Transposable genetic elements (preliminary introductions) 5. Genetic engineering- preliminary concepts and common examples 	CG	14	

	6. Introductory principles of common methods used in cellular and molecular biology: PCR, RFLP, DNA fingerprinting, Gene sequencing			
	Immunology (20) <ol style="list-style-type: none"> 1. What is Immunology: a short preview of the development of the subject 2. Innate (Nonspecific) and Acquired (Specific) immunity. 3. Central dogma of Immune system: (a) Cells of Immune system (b) Organs of Immune system- Primary & Secondary lymphoid organs. 4. Concept of Antigen & Antigen Presentation: Antigenic determinant (for ABO and Rh group only) 5. The Major Histocompatibility Complex: Antigen processing & presentation 6. Concept of T Cell-Antigen recognition and activation [Intracellular signal transducing enzymes excluded]: Structure and function of TCR complex, APC-T Cell interaction, 7. Concept of B Cell Activation and Antibody production [Intracellular signal transducing enzymes excluded]: Structure & Function of Immunoglobins [class switching among Immunoglobulin gene excluded]. Antigenic determinants of Immunoglobins (Isotype, Allotype & Idiotypic). 8. Cytokines (source & function of IL-1, IL-2, IL-4, IL-5, IL-6, IL-8, IL-10, IL-12, Interferons, Tumor Necrosis Factors, Tumor Growth Factors, GM-CSF, M-CSF). 9. The Complement System (Basic concepts & Types only) 10. Techniques in Immunology: ELISA, RIA, Immunodiffusion Techniques. 	RS	24	
	End of part 2	Total classes: 109		

Resources:

- NMS-Immunology by R. Hyde, Williams and Wilkins Or Basic Immunology : Functions and disorders by Abbas and Litchman, W. B. Sanders & Co.
- Kuby's Immunology by Goldsby, Kindt and Osborn, W.H. Freeman

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- The nature of the class-topic (viz. Theoretical, Practical, and Tutorial).
- Methodology of teaching (whether using ICT, engaging students in group discussion, quiz etc. etc.)
 - Different modes of assessment. (Please check UGC evaluation reforms).

Lesson Plan for: Part III (Paper 7 and 8).

- Course Outcome:
- **CO1:** The basic objective of the paper 7 and 8 is to deliver the information to new comers on endocrine system with emphasis on the chemical structure of hormone, mechanism of hormone action, endocrine glands and their disorders.
- **CO2:** To understand the structure of hypothalamus and anterior pituitary and the associated hormones and the related disorders will be explained.
- **CO3:** Students learn the concepts of endocrine systems and homeostasis and 2 bioassay methods.
- **CO4:** Students also learn about the reproductive cycle of primates and non-primate mammals.

Course planner:

Academic year 2017-18	Course Module	Teacher	Class-hour	Remarks*
JULY, 2018 to 13 th Oct.	Module 802: Environmental Pollutions and Toxicology <ol style="list-style-type: none"> 1. Environmental pollutions (nature and sources of pollutants, impacts on ecosystems and humans, remedies): water, soil, air and sound pollutions 2. Environmental laws: major ones applicable in West Bengal 3. Toxicology: including its significance as a branch of Science 4. Dose-response relationships 5. In vivo and In vitro toxicity tests 6. Introduction to the concepts of detoxication mechanisms 	SM	10	Classroom teaching
	Module 701: Animal Physiology <ol style="list-style-type: none"> 1. Transport across cell surface membrane, Donnan membrane equilibrium. 2. Functions of mammalian blood: Oxygen transport and CO₂ transport 3. Neurophysiology: Generation of action potential and propagation of nerve impulse in myelinated and non-myelinated nerve fibers. Synaptic and neuro-mascular junctions: structure and functions 4. Respiration: gill respirations in fishes, respiration in air-breathing fishes, respiration in avian lungs 5. General architecture of skeletal (striated) muscle and smooth muscle; Ultrastructure of skeletal muscle sarcomere, molecular structure of actin and myosin, Muscle contraction: sliding filament theory 	CG	9	Classroom teaching
	Module 703: Histology <ol style="list-style-type: none"> 1. Basic tissue types: epithelial, connective, cardiac and nervous tissue (typical structure of neuron and types of neuron, glial cells etc) 2. Membrane specializations of epithelia. 	RS	9 hr	Classroom teaching

	(Intercellular surface [cell junctions], luminal surfaces and basal surfaces.). 3. Exocrine glands: Types and discharge of secretory products (merocrine, apocrine, holocrine).			
	Module 702: Endocrinology and Reproductive biology 1. Classification of vertebrate hormones based on chemical nature and mechanism of action (names and examples only). 2. Hormone delivery systems: Endocrine, neuroendocrine, paracrine, neurocrine, autocrine (Definitions and examples only) 3. Feed back control of hormone secretion: negative and positive. 4. Hormone biosynthesis (including sites of synthesis, outlines only): Thyroid hormones (T ₃ , T ₄), testosterone, estrogen, progesterone, adreno-cortical hormones, Insulin, Adrenal catecholamines. 5. Physiologic functions of hormones: Insulin, glucagon, T ₃ and T ₄ .	SP	12 hr	Classroom teaching
	1. Organogenesis: development of brain in chicken 2. Conceptual outlines (very brief) of – Cell potency and Stem Cells, Sex determination in <i>Drosophila</i> and Man, Environmental sex determination in reptiles. HOX genes in development	CG	7	Classroom teaching
	Module 805: Medical Zoology 1. Mosquito-borne diseases: Malaria and Filariasis-causative agents, their life cycle, modes of infections in man, major modes of treatments, major vector species in India, their ecology and life cycles, control measures 2. Mosquito-borne diseases: Dengue and DHF, Chikungunya- causative virus, symptoms and treatments 3. Visceral Leishmaniasis (Kala-azar)- causative species and vectors in West Bengal 4. Common ticks and mites in human surroundings and diseases caused by them	KK	8	Classroom teaching
26th Sept to 21st Oct Puja vacation.				
	1. Hormonal control of spermatogenesis 2. Hormonal control of mammalian ovarian cycle, differences between estrous and menstrual cycle. 3. Mechanism of hormone actions (outlines only): cytoplasmic receptor, nuclear receptor, membrane receptor, HRE, HSP, cAMP, cGMP, IP ₃ —DAG, tyrosine kinase, calcium-calmodulin.	SP	8	Classroom teaching

NOV, 2017 to 15 th MAY, 2018.	4. Endocrine disorders (<i>symptoms and causes only</i>): Diabetes insipidus; IDDM & NIDDM, Hypothyroidism and hyperthyroidism, Conn's and Cushing's syndrome.			
	Module 801: Developmental Biology <ol style="list-style-type: none"> 1. Outlines of historical concepts and experiments in the emergence of developmental biology- Induction, Fate map, Spemann and Mangold's organizer transplant experiments, von Baer's laws. 2. Germ layers and its contributions to the development of different tissues in vertebrates. 3. Origin of germ cells, Structural features of sperms and eggs in sea urchins and in mammals, Gametogenesis in mammals, 4. Fertilization: external fertilization in sea urchins, internal fertilization in mammals (in depth molecular details not required) 5. Cleavage : Types of cleavage found in animals and animal groups that exhibit a type, outlines of cleavage process in <i>C. elegans</i>, Zebra fish and <i>Xenopus</i> and chick 	SM	15	Classroom teaching
	Module 006: Economic Zoology <ol style="list-style-type: none"> 1. Fishes and fishery: diversity of indigenous freshwater, estuarine, marine fishes and shell fishes in West Bengal. Invasive and exotic species of fishes in West Bengal. Techniques of modern pisciculture and prawn culture. Problems related to wild prawn seed collections in Sunderbans, fish productivities in India and West Bengal, ecology and degradation of freshwater fish habitats and decrease in wild fish stocks (very brief idea) 2. Sericulture: silks and silk worms, sericulture practices- methods, scopes and problems 3. Apiculture: Honey bees and their behaviours in relation to bee-keeping, popular methods of bee keeping, scopes and problems. 	KK	13	Classroom teaching
	<ol style="list-style-type: none"> 1. Swim bladder and its functions in teleost fishes 2. Water and osmotic regulations : problems in marine cyclostomes, elasmobranchs and teleosts, freshwater teleosts, in hot desert environments (camel) and examples of significant adaptations solving it by different animal groups 3. Urine formation in human kidney 4. Bioluminescence: occurrence, mechanism of production 	CG	14	Classroom teaching
	<ol style="list-style-type: none"> 1. Lac culture: Lac and lac insects, host plants and lac cultivation, scopes and problems 2. Poultry birds: different breeds, their advantages and disadvantages, importance of indigenous breeds 	RS	24	Classroom teaching

	3. Cattle, goats and lambs: different breeds, their advantages and disadvantages, importance of indigenous breeds.			
	End of part 3	Total classes: 115		

Resources:

- Fish and Fisheries of India by Jhingran. Hindustan Publishing
- Encyclopedia of Economic Zoology. 2 vols. By Khan, A. A. (Editor), 2007. Anmol Publications. 2007
- Freshwater Aquaculture by Santhanam *et al.*
- Books: Guyton 11th edition, Ganong W. - Review of medical physiology, Kronenberg - _Williams_Textbook_of_Endocrinology_11e, endocrinology by Hadley, mammalian endocrinology by Ashoke Kr. Boral.
- Other resources: internet source such as- Wikipidia, www.britannica.com, youtube.com

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- Methodology of teaching (whether using ICT, engaging students in group discussion, quiz etc. etc.)
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