CHOICE BASED CREDIT SYSTEM (CBCS)

Department of Zoology, University of Kalyani

Effective from 2017-2018 Session

Semester -1

Course Name	Subject	Points	Credit	Hours / Week
Hard Core Theory				
ZHT-101	Non Chordate and Insect Organization	75	3	4
ZHT-102	Parasitology and Ecology and environment	75	3	4
ZHT-103	Developmental Biology and Cytogenetics	75	3	4
ZHT-104	Animal Physiology and Biochemistry and Metabolic Processes	75	3	4
Hard Core Lab				
ZHL-101	Non Chordate and Insect Organization	25	1	3
ZHL-102	Parasitology , Ecology and environment	25	1	3
ZHL-103	Developmental Biology and Cytogenetics	25	1	3
ZHL-104	Animal Physiology and Biochemistry and Metabolic Processes	25	1	3
Library / Field Work / Class Test				2
Total points & Credits in Semester I		400	16	30

SEMESTER –I

HARD CORE THEORY PAPERS

ZHT-101 : Non Chordate and Insect Organization	**Points 75**
Non Chordate ----------	**Point 37**
1. Cell organelles in protozoa - Golgi, Mitochondria, Kinetoplast, Pellicle and Cuticle	**5**
2. Osmoregulation in Protozoa.	**4**
3. Cell association and cellular differentiation in protozoa	**4**
4. Sensory organelles and reaction for stimuli in protozoa	**4**
5. Insect blood : composition, functions, morphology of circulatory system	**3**
6. Morphology of excretory organs and their function in insects	**3**
7. Insect flight: structure concerned, functional mechanism.	**3**
8. Insect visual organs, their structure and functional mechanisms	**4**
9. Structure and function of sound producing organs in insects, significance of sound production. Uses of sound in plant protection	**4**
10. Photogenic organs in insects : structure, mechanism and significance of light production	**3**
Insect Organization ----------	**Point 38** **Lectures**
1. Modern classification of insects	**4**
2. General organization, segmentation, division of body:	
i) Head and mouth parts in general	**4**
ii) Thorax and thoracic appendages. Modification of legs and wings.	**4**
iii) Abdomen and abdominal appendages.	**4**
3. Integument: Basic structure and functions.	**4**
4. Digestive organs: Structure and functions; Peritrophic membrane, Filter chamber	**4**
5. Morphology of respiratory organs and mechanism of respiration	**4**
6. Morphology of central nervous system.	**4**
7. Metamorphosis: Basic concept (e.g. House fly),	**2**
8. Exocrine glands: Lac gland, Wax gland, Silk gland, Labial gland.	**4**

ZHT-102: Parasitology, Ecology and environment	**Points 75**
Parasitology	**Point 37 Lectures**
1. Classification of Protozoa and Helminths.	6
2. Mode of transmission of *{Plasmodium, Trypanosoma, Piroplasm)*	7
3. Zoonosis with particular reference to *Toxoplasma, Balantidium, Entamoeba, Schistosoma.*	7
4. Microspora: Structure and life history of *Nosema bombycis* - impact on sericulture.	5
5. Life cycle, biology, pathogenesis,, epidemiology and control of important human and veterinary helminthes - *Diphyllobothrium latum, Paragonimus westermani, Trichinella spiralis.*	6
6. Salient features of plant parasitic nematodes and life cycle patterns of i) *Heterodera rostochiensis,* ii) *Meloidogyne hapla, Anguina*	6
Ecology and Environment ----------	**Point 38 Lectures**
Ecology	
1. The Ecosystem: concept, Gaia hypothesis, cybernetic nature and stability of the ecosystem, ecosystem management and optimization.	**3**
2. Niche theory : Niche concepts, niche width	**3**
3. Community: Structure and Gradient analysis	**3**
4. Biogeochemical cycle: Nitrogen and phosphorus cycle	**6**
5. Population attributes: Growth forms and mathematics of growth, Life Table - (Cohort and Static); survivorship curves, generation time, net reproductive rate. Life history strategies: Evolution of life history traits, strategies related to longevity; clutch size; life history optimization.	**6**
6. Metapopulation: Concept, models , structure and dynamics	**6**
7. Major terrestrial biomes; major biogeographical zones of India	**2**
Environment	
1. Concept of Environment: Structure, radiation balance, climate cycle.	**3**
2. Anthropogenic impact on environment: Green house gases, global warming, ozone depletion, UN movements on environment.	**3**
3. Environment and agriculture: Green revolution and its impact on environment, organic farming, participatory approach in agriculture.	**2**

4. Theory and analysis of conservation: Stochastic perturbations, population viability analysis, recovery strategy for threatened species.	**1**

ZHT 103: Developmental Biology and Cytogenetics	**Points 75**
Developmental Biology	**Point 37 Lectures**
1. Basic concepts in Developmental Biology: potency, commitment, specification, induction, competence, determination and differentiation, morphogenetic gradient and fate map 2. Stem cells: embryonic stem cells and adult stem cells; stem cell niches 3. Sex, Gametes and Fertilization: i) Germ cell migration ii) Gametogenesis iii) Gamete recognition, contact and fertilization, prevention of polyspermy. 4. Axis specification in vertebrates: i) Early patterning in vertebrates - Symmetry breaking, Nieuwkoop center. Wnt and cadherin signaling ii) Left- right asymmetry in vertebrates - Asymmetric gene expression 5. Metamorphosis and organogenesis: Axes, compartment formation and pattern formation in *Drosophila;* Homeobox genes and development; development and metamorphosis of tadpole larvae; limb development and regeneration in vertebrates 6. Concept on aging and senescence.	10 2 8 8 7 3
Cytogenetics	**Point 38 Lectures**

1. Organization and structure of genomes - size, complexity, gene-complexity, virus and bacterial genomes, organelle genome, architecture of mitochondrial genome, conserved chloroplast DNA; organization and nature of nuclear DNA in eukaryotes; transposable elements, retro-transposons, SINE, LINE, Alu and other repeat elements, pseudogenes, segmental duplications ; super coiling of DNA	13
2. Cell cycle, apoptosis and cancer : Phases of cell cycle. Regulation of cell cycle: Discovery of MPF, cyclins and cyclin dependent kinases, Check points- role of Rb and p53 ; Cancer: Types and stages. Tumor suppressor genes and protooncogenes. Molecular basis of cancer.; Apoptosis: Neurotrophic factors, caspases, Pathways of apoptosis; cell senescence, telomerase	15
3. DNA replication: nature, enzymology of replication, replication fork; fidelity of replication; extrachromosomal replicons; leading and lagging strands; Okazaki fragments; termination of replication	10
ZHT 104: Animal Physiology & Biochemistry and Metabolic Processes	**Points 75**
Animal Physiology	**Point 38 Lectures**
1. Respiratory function of blood: a) Respiratory pigments - distribution and brief chemistry b) Function of hemoglobin-i) in adult and ii) during embryonic life c) Environmental influences.	10
2. Physiology of muscles: a) Chemical nature of contractile elements b) Role of structural and regulatory proteins in muscular contraction c) ATP and signal molecules in muscular contraction	10
3. Physiology of excretion: Formation of urine: glomerular filtration; tubular function; counter current mechanism and urine formation	10
4. Synaptic and functional transmission; a) Pre-and postsynaptic structure and function b) Chemical transmission of synaptic activity	8
Biochemistry and Metabolic Processes	**Point 37 Lectures**

	4
1. Proteins: Protein folding and protein stability.	
2. Bioenergetics and oxidative metabolism:	4
3. Thermodynamic principles and steady-state conditions of living organism; standard free energy change in a reacting system; energy change for ATP hydrolysis.	
4. Amino acid metabolism a. Amino acid classification b. Urea cycle	3
5. Carbohydrate and lipid metabolism	
a. Biosynthesis and transport of cholesterol	3
b. Glycolysis, glycogenolysis, gluconeogenesis, interrelationship between different carbohydrate metabolism	8
6. Enzymes:	
a. Kinetic analysis of enzyme-catalyzed reaction b. Regulation of enzyme activity	5
c. Allosteric control of enzyme activity	6
7. Intracellular protein traffic for secretory and non-secretory cells: protein synthesis, intracellular transport, packaging, storage and release	4

CORE LAB

ZHL 101: Non Chordate & Insect Organization	**Point 25**
Dissection (Non Chordate) 1. Grasshopper : Reproductive; Air sacs 2. Cockroach: Male reproductive 3. Crab : Digestive and Nervous 4. Honey bee: Poison apparatus **Dissection (Insect Organization)** 1. Mosquito : Head,mouth parts and wing 2. Housefly: Head, mouth parts and wing 3. Honey bee : Pollen basket 4. Drosophila: Arista	

ZHL 102: Parasitology & Ecology and environment	Point 25
Parasitology 1. Collection, fixation, staining and preservation of protozoa by wet and dry method. 2. Staining ureeolarid ciliate by Kelin's silver impregnation technique 3. Collection and preservation of endohelminthes of vertebrates. 4. Laboratory records **Ecology** 1. Determination of Primary Productivity of water 2. Determination of orthophosphate of water 3. Determination of organic carbon of soil 4. Laboratory records	
ZHL 103: Developmental Biology & Cytogenetics	**Point 25**
Developmental Biology	
1. Preparation of Whole mounts of 24 and 48 hrs. Chick/ Koel embryos. 2. Study of serial section of chick embryo of 48 & 72 hrs (emphasis to be given on Brain, Eye, Gut and tail bud region). 3. Identification of different developmental stages of Amphibia. 4. Influence of temperature and teratogenes on animal development. **Cytogenetics** 1. Study of mutant phenotypes of Drosophila. Demonstration of law of segregation using Drosophila mutants. 2. Chromosome preparation from mice bone marrow cells- a. Chromosome banding (C, G, H banding). b. Study the differences in number, shape and size of chromosomes in normal vs. tumor cells, or normal vs. irradiated cells. 3. DNA extraction	
ZHL 104: Animal Physiology & Biochemistry & Metabolic Processes	**Point 25**

Animal physiology 1. Blood pressure and pulse rate - Effect of exercise. 2. Estimation of rate of 0_2 consumption, $C0_2$ release and RQ in cockroach/mice Laboratory records **Biochemistry & Metabolic Processes** 3. Action of insulin on blood glucose level in rat 4. Kinetic study of an enzyme - urease/ catalase	