Annexure III

GOA UNIVERSITY
DEPARTMENT OF ZOOLOGY

SEMESTER I

ZOC 101 : Animal Taxonomy & Diversity

NO. OF CREDITS: 4 CONTACT HOURS: 60
ALL MODULES CARRY EQUAL WEITAGE

Module 1: Introduction to taxonomy, stages of taxonomy, importance of taxonomy, problems of taxonomists. Rise of taxonomy, New trends in taxonomy

Zoological classification concept of speciation, Taxonomic collections, identification and description, Zoological nomenclature

Module 2: Diversity of life, Global faunal biodiversity, faunal diversity of India, Benefits of diversity, Value of biodiversity, Causes of biodiversity loss, protection of biodiversity, Biodiversity act in India

Challenges in monitoring and preserving biodiversity, human dependence of biological diversity, Diversity at risk: the global perspective, restoration of diversity, Policies to protect diversity

Module3: Molecular basis of animal diversity, Genetic polymorphism, electrophoretic variations, amino acid sequencing for variety of proteins, DNA-DNA and DNA- RNA hybridization.

Module4: General Organization and systematic position of minor phyla Lopophorates, Phoronida, Ectoprocta, Brachiopoda, Pogonophora, Chaetognatha, Acanthocephala, Entoprocota and Sipunculida

Phyllogeny and general organization of Protozoa, Porifera, Coelenterata, Helminths, Annelida, Arthropoda, Mollusca and Echinodermata

Reference Books:

Barnes R.D. “Invertebrate Zoology” (Halt Saunders Intl.Edition)
Belsare, D.K.. “Introduction to biodiversity” (APH Publishing Corp. New Delhi)
Ekambarnath Ayyar. “ Zoology Vol-I & II”(Pub: S. Vishwanath, Madras)
Groombridge B. (Ed). “Global biodiversity: Status of Earth’s living resources”. (Chapman and Hall Publ. London)
Hymen L.H. “The invertebrates (all volumes)” (McGraw Hill. Philedelphia USA)
Huston A. Michael, “Biological diversity” (Cambridge University Press, Cambridge)
Kapoor, V.C. “Theory and Practice of animal taxonomy” (Oxford and IBH Publ. Delhi)
McNeely, J. A.” Economics and biological diversity” (IUCN, Gland, Switzerland)
Prasad, S. N. “Life of Invertebrates”(Vikas Publ. New Delhi)
Wilson, E. O. (Ed), “Biodiversity”(National Academy Press, New York)

Annexure III

GOA UNIVERSITY
DEPARTMENT OF ZOOLOGY

SEMESTER I

ZOC 102 : Comparative Functional Anatomy of Non Chordates & Chordates

NO. OF CREDITS: 4 CONTACT HOURS: 60

ALL MODULES CARRY EQUAL WEITAGE

Module 1: SKELETAL SYSTEM:

Skeletal system of Arthropods and Echinoderms. Evolution and basic plan of vertebra construction. Tetrapod limbs and their modification.

MOVEMENT AND LOCOMOTION:

Structure of pseudopodia, flagella and cilia in protozoa and their theories of locomotion. Locomotion in annelids . Types of vertebrate musculature. Appendicular musculature of tetrapodes. Flight muscles of insects and birds.

Module 2: DIGESTIVE SYSTEM:

Feeding apparatus of molluscs. Ciliary mode of feeding in lower chordates. Oral glands and stomach in land vertebrates.

URINOGENITAL SYSTEM:

Excretory organs of helminthes, annelids and molluscs. Reproductive system in arthropods. Testes and vasa deferentia in tetrapods. Ovary and oviduct of tetrapods.

Module 3: RESPIRATORY SYSTEM:

Respiratory organs of annelids and molluscs. Pharyngeal basket in lower chordates. Accessory respiratory organs in

fishes. Vertebrate lungs. Respiratory pigments in non-chordates and chordates.

VASCULAR SYSTEM:

Vascular system in annelids, arthropods and molluscs. Evolution of portal system. Lymphatic system in land vertebrates.

Module 4: NERVOUS SYSTEM:

Nervous system of annelids, arthropods and molluscs.

SENSORY SYSTEM:

Sensory system in cnidaria; Sensory Receptor organs of vertebrates & their function.

Reference Books:

1. Invertebrate structure and function by E.J.W Barrington
2. Vertebrates: comparative anatomy, function, evolution By Kenneth V. Kardong
3. Hyman's Comparative Vertebrate Anatomy By Libbie Henrietta Hyman, Marvalee H. Wake
4. Functional anatomy of the vertebrates: an evolutionary perspective By Karel F. Liem, Warren Franklin
5. A functional anatomy of invertebrates By Vera Fretter, Alastair Graham
6. Functional chordate anatomy By Ronald G. Wolff

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GOA UNIVERSITY
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SEMESTER I

ZOC 103 : Advanced Animal Physiology

NO. OF CREDITS: 4 CONTACT HOURS: 60
ALL MODULES CARRY EQUAL WEITAGE

Module 1: MEMBRANE PHYSIOLOGY:
Physiology of excitable cells, membrane excitability, membrane channel; Thermodynamic relations; Transport across the membranes;

Module 2: REGULATION OF MOVEMENT:
Neural control of movement; Properties of motor units; peripheral motor control: spinal reflex, actions of muscles, units and cutaneous receptors; Functional organization of motor neurons; Spinal and supra-spinal control of movement; Vestibular system; Motor functions of cerebral cortex.

Module 3: GASTROINTESTINAL PHYSIOLOGY:
Neuronal and hormonal control of gastrointestinal motility; Transport and mixing of food in the alimentary tract; Secretary functions: secretion of saliva, gastric secretion, pancreatic secretion and intestinal secretion; Digestion and absorption of carbohydrates, proteins and fats; formation of faces; physiology of gastrointestinal disorders.

Module 4 : PHYSIOLOGY OF CIRCULATION AND RESPIRATION:

Intracellular electrical activity in heart; Cardiac Mechanics; Events of the cardiac cycle: measurement of pressure, flow and volume; Arterial and venous system.

Structural and mechanical aspects of respiration; Respiratory gas exchange ratio, blood gas transport; ling perfusion; pulmonary capillary gas equilibrium.

SPORTS PHYSIOLOGY:

The muscles and exercise; Respiration and cardiovascular system in exercise; Dope test; Drug abuse.

Reference Books:

1. A G Giese " Cell Physiology" (W B Saunders Co.)
2. H T Yost " Cellular Physiology" (Printince Hall)
3. Edwards & Hassal " Biochemistry & Physiology of cells" (Mc.Graw Hill)
4. A C Guyton " Text Book of Medical Physiology" (Saunclers Co)
5. Eckert and Randall " Text book of Physiology"
6. W F Ganong " Review of Medical Physiology" (Lange Medical Publication)
7. Wilmore, Costill and Kenney " Physiology of sport and exercise" (Amazon, UK)

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SEMESTER I

ZOC 104 : Advance Genetics

NO. OF CREDITS: 4 CONTACT HOURS: 60
ALL MODULES CARRY EQUAL WEITAGE

Module 1: Interallelic and Intergenic interactions; Totipotency; Pleiotrophy; Homeostasis Non-Mendelian inheritance: Extranuclear inheritance; Yeast mitochondrial genome; Universality of the genetic code; Maternal effects, Nucleo-cytoplasmic interactions; Extra chromosomal inheritance, Hybrid digenesis

Human Mitochondrial genome; Diseases of mitochondrial DNA in man; Maternal inheritance of these diseases; LHON & OXPHOS; Homoplasmy and heteroplasmy; Interaction between mitochondrial and nuclear genome.

Module2: Drosophila Genetics: Biology and life cycle of Drosophila; Drosophila as “Cinderella of genetics”; Chromosome constitution; Polytene chromosomes; puffs as regions of gene transcription; Lozenge in Drosophila

DNA Synthesis and Sequencing: Synthesis of DNA on a template; Synthesis of DNA without a template; Nucleotide sequencing; Sequencing Human Genome; Chromosome walking; Chromosome jumping; Chromosome landing; Peptide Nucleic acid; Universal nucleoside

Module 3: DNA damage : Characteristics of mutations; classification of mutations; Environmental Mutagenesis, Site directed mutagenesis, Atimutagens (Desmutagens and Bioantimutagens)

DNA and Non-DNA Repair: DNA repair systems / mechanisms in prokaryotes (direct repair, Excision repair, Strand transfer repair, post replication repair); DNA repair systems / mechanisms in eukaryotes (Nucleotide excision repair); Non-DNA Repair (Structure of the code, Suppression, Isolation of germ cells; lethality and selection; Diploidy / polyploidy)

Module 4: Molecular markers in genome analysis: RFLP, RAPD and AFLP analysis; Molecular systematic: Patterns of descent, Classification of organisms based on the molecular genetic information; DNA Profiling & Bar coding

Epigenetic: Definition; brief history; Epigenetic patterns; Mutations and Epimutations; Cellular transformation; chromosome imprinting; Epigenetic defects and ageing.

Reference Books:

Alberts et al (2008) Molecular Biology of the cell, Garland Science, Taylor & Francis Group, New York, USA

Brown TA (1998) Genetics – A Molecular Approach, III Edition, Chapman & Hall Publishers, London

Brown TA (2002) Genomes, Viva Books Ltd.

Brown TA, Genomes 3, Garland Science Publishing, London, UK

David AC and Jenuwein T (2007) Epigenetics, Cold Spring Harbor Laboratory Press, New York, USA.

De Robertis EDP & De Robertis EMF (1995) Cell and Molecular Biology VIIIth (Indian) edition

Griffiths AJF, Gelbart WM, Lewontin RC and Miller JH (2002) Modern Genetic Analysis: Integrating Genes & Genomes, WH Freeman & Co. New York

Griffiths AJF, Miller JH, Suziki DH, Lewontin RC and Gelbart WM ( ) An Introduction to Genetic Analysis, WH Freeman & Co. New York

Halla DM, Moritz C, Mable BK (1996) Molecular Systematics, Sinaner Associates Inc. Sunderlan, Massaxheusetts, USA

Hartl DL and Jones EW (2001) Genetics: Analysis of Genes and Genomes, Vth Edition, Jones & Bartlett Publishers, Boston

Lewin B, Genes IX, Oxford University Press, Oxford, New York

Lodish et al (2007) Molecular Cell Biology, WH Freeman & Co. New York

Miglani GS (2002) Advanced Genetics, Narosa Publishing House

Primrose SB and Twyman RM (2006) Principle of Genome Analysis and Genomics, 7th Edn. Blackwell Publishing Co. Malden, USA

Watson JD et al (2004) Molecular Biology of the Gene, 5th Edition, Pearson Education, Delhi

Watson JD, Hopkins NH, Roberts JW, Steitz JA & Weiner AM (1987) Molecular Biology of the Gene, Vol. I & II, General Principles, IVth / Latest edition, The Benjamin Cummings Publishing Co., Inc. Tokiyo

Annexure III

GOA UNIVERSITY
DEPARTMENT OF ZOOLOGY

SEMESTER I

ZOC 105: Laboratory Course (based on ZOC101 & ZOC102)

NO. OF CREDITS: 2 NTACT HOURS: 30
ALL MODULES CARRY EQUAL WEITAGE

Module 1:

Study of taxonomic characters, identification and classification of members of Protozoa, Porifera, Coelenterate, Helminths, Annelids, Arthropods, Molluscs and Echinodermates, fishes, amphibians, reptiles, aves, mammals and minor phyla.

Study of techniques of collection, preservation and mounting of Insects.

Module 2:

Osteological preparation of chick and rat. Study of vertebrae, limb bones and girdles.

Appendicular muscles of rat. Flight muscles of birds

Digestive system of cockroach. Mounting of Salivary glands.

Afferent and efferent branchial system of fishes; Renal portal system of rat; Aortic arches in rat and chick

Exposure of Swim bladder of fish, trachea and spiracle of cockroach.

Nervous system of crab cranial nervous system of teleosts and rat.

Comparative anatomy of brain of fish, chick and rat.

Reproductive system of cockroach.

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GOA UNIVERSITY
DEPARTMENT OF ZOOLOGY

SEMESTER I

ZOC 106 : Laboratory Course (based on ZOC103 & ZOC104)

NO. OF CREDITS: 2 CONTACT HOURS: 30

ALL MODULES CARRY EQUAL WEITAGE

Module 1:

Electrophysiology of membrane of excitable cells

Effect of temperature on electrical activities of cells and nerves

Electrophysiology of heart with reference to resting membrane potential and action potential;

Effect of ions and ion channel blockers on the electrical activities /potential of heart /nerves

Transport of glucose and amino acids across the intestine of rat and factors affecting the transport

Finger muscle contraction and induction of fatigue with reference to mechanical load and exercise duration

Study of human lung volume during rest and exercise.

Module 2:

Isolation/Extraction of genomic DNA from tissue (liver of mouse/rat)

Extraction/isolation of genomic DNA from mammalian blood (man)

DNA separation by Agarose Gel Electrophoresis

Protein extraction and separation by PAGE

Culture and maintenance of Drosophila

Study of Life cycle and Mutant Phenotypes of Drosophila

Paper chromatographic separation of proteins (Drosophila eye pigments)

Study of transcriptional activity in polytene chromosomes

Induction of phenocopies in Drosophila

Demonstration of Green Fluorescence and Red Fluorescence protein for monitoring gene expression.

Observation of DNA fragmentation in Apoptotic cells