

**ST. JOSEPH'S COLLEGE, DEVAGIRI, CALICUT
(AUTONOMOUS)**



UNDER GRADUATE DEGREE PROGRAMME

**ST. JOSEPH'S CHOICE BASED CREDIT SEMESTER SYSTEM
(SJCBCSSUG)**

**BACHELOR OF SCIENCE (B.Sc.)
IN
ZOOLOGY
(CORE, OPEN & COMPLEMENTARY COURSES)**

**Course Outcome
(2019Admn Onwards)**

COURSE OUTCOMES

Core Courses

SEMESTER I

GZOL1B01T – ANIMAL DIVERSITY: NON-CHORDATA PART - I

Credits: 2

Contact Hours: 36 Hrs (2 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Describe the principles of classification and nomenclature (5 hrs)
CO2	Explain the five kingdom classification of living organisms (1 hr)
CO3	Understand the concepts of classification of animals (4 hrs)
CO4	Explain the classification with examples and characteristic features of kingdom Protista and describe the morphology and structural organization of <i>Paramecium</i> (6 hrs)
CO5	Describe the characteristic features of subkingdom Mesozoa (1 hr)
CO6	Explain the classification of phylum Porifera and elucidate the salient features of each class (3 hrs)
CO7	Describe the characteristic features of phylum Cnidaria and Ctenophora, illustrate the classification of phylum Cnidaria down to classes and explain the structural organization of <i>Obelia</i> (8 hrs)
CO8	Explain the salient features of phylum Platyhelminthes and illustrate its classification down to classes (3 hrs)
CO9	Explain the characteristic features and classification of super-phylum Aschelminthes and phylum Nematoda (3 hrs)
CO10	Elucidate the characters of Pseudocoelomate minor phyla Rotifera and Gastrotricha (2 hrs)

SEMESTER 2

GZOL2B02T – ANIMAL DIVERSITY: NON-CHORDATA PART-II

Credits: 2

Contact Hours: 36 Hrs (2 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Explain the classification with examples and characteristic features of phylum Annelida and describe the morphology and structural organization of Nereis (7 hrs)
CO2	Describe the distribution, peculiarities and affinities of phylum Onychophora (2 hrs)
CO3	Explain the classification of phylum Arthropoda; elucidate the salient features of each class and describe the morphology and structural organization of Penaeus (11 hrs)
CO4	Describe the characteristic features of phylum Mollusca, illustrate its classification down to classes and explain the structural organization of Pila globosa (8 hrs)
CO5	Explain the salient features of phylum Echinodermata and illustrate its classification down to classes (4 hrs)
CO6	Understand the salient features and affinities of phylum Hemichordata (1 hr)
CO7	Elucidate the characters of coelomate minor phyla Phoronida, Ectoprocta and Echiura (3 hrs)

SEMESTER 3

GZOL3B03T – ANIMAL DIVERSITY: CHORDATA PART - I

Credits: 3

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Explain the characteristics of chordates and outline classification of the phylum Chordata (2 hrs)
CO2	Describe the salient features and affinities of subphylum Urochordata and its classification down to classes; elucidate the morphology and structural organization of Ascidia (5 hrs)
CO3	Explain the salient features and affinities of subphylum Cephalochordata with reference to Branchiostoma (4 hrs)

CO4	Describe the salient features of subphylum Vertebrata, illustrate its classification down to classes and elucidate the characteristics of division Agnatha (3 hrs)
CO5	Enumerate the salient features of superclass Pisces and illustrate its classification down to orders and the morphology and structural organization of Mugil cephalus (12 hrs)
CO6	Describe the salient features and affinities of class Amphibia and its classification up to orders; explain the morphology and organ systems of Hoplobatrachus tigerinus (13 hrs)
CO7	Elucidate the characteristic features of the class Reptilia and its classification down to orders; describe the morphology and organ systems of Calotes versicolor (15 hrs)

SEMESTER 4

GZOL4B04T – ANIMAL DIVERSITY: CHORDATA PART- II

Credits: 3

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Describe the classification of class Aves down to orders, salient features of each order with suitable examples (11 hrs)
CO2	Describe the external characters and functional systems of <i>Columba livia</i> (14 hrs)
CO3	Enumerate the salient features and classification of class Mammalia down to orders with suitable examples (11 hrs)
CO4	Elucidate the external characters and functional systems of <i>Oryctolagus cuniculus</i> (14 hrs)
CO5	Compare the circulatory, excretory and nervous systems of vertebrates (4 hrs)

SEMESTER 1, 2, 3 & 4

GZOL4B05P – ZOOLOGY CORE PRACTICAL – I

Credits: 4

Contact Hours: 144 Hrs (2 Hrs/Week)

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Identify and describe specified protists and acoelomate & pseudocoelomate non-chordates and perform the culture of selected protists; understand the histological features of coelenterate, platyhelminth and nematode. (36 hrs)
CO2	Identify and describe specified coelomate non-chordates and the transverse sections of annelids; Perform mounting of the specified organs of selected non-chordates. (36 hrs)
CO3	Identify and describe specified chordates and specified bones of chordates; Prepare key for identification of venomous snakes; Perform mounting and dissection of specified organ systems of chordates. (36 hrs)

CO4	Identify and describe selected vertebrates and specified bones of vertebrates.(36 hrs)
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SEMESTER 5
GZOL5B06T – CELL BIOLOGY AND GENETICS

Credits: 4

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Understand the principles and applications of various types of light microscopes, electron, Scanning-tunnelling and Atomic force microscope and illustrate the histological and histochemical processing of tissues (7 hrs)
CO2	Explain the basic structure of a eukaryotic cell and the structure and functions of plasma membrane, mitochondria, lysosome, cytoskeletal elements and interphase nucleus (12 hrs).
CO3	Illustrate the nucleosome organization of chromatin and higher order structures; structure of chromosomes and giant chromosomes (2 hrs).
CO4	Enumerate eukaryotic cell cycle and cell division by amitosis, mitosis and meiosis (4 hrs)
CO5	Explain the causes of transformation, characteristics of transformed cells and the role of protooncogenes and tumor suppressor genes in malignant transformation; mechanism and significance of apoptosis (2 hrs)
CO6	Enumerate allelic and non-allelic gene interactions; supplementary, complementary, polymeric, duplicate and modifying genes and polygenic inheritance (5 hrs).
CO7	Illustrate multiple allelism and solve problems related to blood group inheritance (4 hrs).
CO8	Explain characteristics of linkage groups and linkage map; crossing over and calculation of recombination frequency; sex-linked, sex-influenced and sex-limited characters; sex differentiation and disorders of sexual development (8 hrs).
CO9	Describe the mechanisms of sex determination including chromosomal, genic, haploid-diploid mechanisms; the hormonal and environmental influence on sex determination and gynandromorphism (3 hrs).
CO10	Explain mutagenesis, mutagens and chromosomal and gene mutations (3 hrs).
CO11	Enumerate the classification and grouping of human chromosomes; numerical and mutational human autosomal and sex chromosomal anomalies; polygenic human traits and genetic counseling (4 hrs).

SEMESTER 5
GZOL5B07T – BIOTECHNOLOGY, MICROBIOLOGY AND IMMUNOLOGY

Credits: 4

Contact Hours: 72 Hrs (4 Hrs/Week)

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Illustrate the steps in genetic engineering and animal cell culture (12 hrs)
CO2	Explain transfection methods, transgenic animals and ethical issues of transgenic animals (5 hrs)
CO3	Enumerate the applications of biotechnology (7 hrs)
CO4	Understand the biological diversity of microbial forms and the various techniques for handling microbes in the laboratory (8 hrs)
CO5	Enumerate the basic structure and life cycle of bacteria and virus (8 hrs)
CO6	Understand the industrial and medical importance of microorganisms (8 hrs)
CO7	Describe different types of immunity and the cells and organs of the immune system (6 hrs)
CO8	Explain antigen, antibody, immunity and major histocompatibility complex (9 hrs)
CO9	Enumerate autoimmune and immunodeficiency diseases and immunology of tumor and organ transplantation (9 hrs)

SEMESTER 5
GZOL5B08T – BIOCHEMISTRY AND MOLECULAR
BIOLOGY

Credits: 4

Contact Hours: 72 Hrs (4 Hrs/Week)

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Understand the elements of biological importance and the non-covalent interactions that stabilize biomolecules (1 hr).
CO2	Describe the classification, types, structure, reactions and biological roles of carbohydrates, and diabetes Type I and II (6 hrs)
CO3	Enumerate the properties and classification of amino acids and their standard abbreviations; hierarchical levels of protein structure, classification, separation, purification and sequencing of proteins (7 hrs).
CO4	Explain the classification and functions of lipids and fatty acids; chemistry and structure of nucleic acids and sequencing of DNA (7 hrs)
CO5	Understand the classification, nomenclature and properties of enzymes; enzyme action, co-enzymes, cofactors, isozymes, ribozymes and allosteric enzymes (3 hrs)
CO6	Explain glycolysis, Krebs's cycle, glycogenesis, glycogenolysis, gluconeogenesis, HMP pathway; amino acid and fatty acid oxidation and oxidative phosphorylation (12 hrs).
CO7	Describe the mechanism of DNA duplication and the role of enzymes (4 hrs).

CO8	Understand the concept of gene and gene expression; genetic code and wobble hypothesis (6 hrs).
CO9	Explain the mechanism of transcription and post-transcriptional modification of hnRNA (7 hrs).
CO10	Enumerate the processes of translation and post-translational modification and targeting of peptides (7 hrs).
CO11	Describe the regulation of <i>trp</i> operon, C-value, repetitive DNA, satellite DNA, selfish DNA, overlapping genes, pseudogenes, cryptic genes, transposons and retrotransposons (8 hrs).
CO12	Explain the structure and life cycle of bacteriophages and the gene transfer mechanisms in bacteria (4 hrs).

SEMESTER 5
**GZOL5B09T – METHODOLOGY IN SCIENCE,
 BIOSTATISTICS AND BIOINFORMATICS**

Credits: 4

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Explain science, its importance, disciplines and the major steps in formulating a hypothesis, various hypothesis models, theory, law and importance of animal models, simulations and virtual testing (6 hrs)
CO2	Illustrate the principles and procedures in designing experiments and elaborate the requirements for carrying out experiments (4 hrs)
CO3	Describe the ethical concerns in practicing science (5 hrs)
CO4	Understand the Scope and role of statistics; methods and procedures of sampling; Construction of tables, charts and graphs (5 hrs)
CO5	Calculate central tendency and measures of dispersion and application of its knowledge on hypothesis testing as well as in problem solving (10 hrs)
CO6	Enumerate major biological databases and database search engines (8 hrs)
CO7	Perform DNA and protein sequence analysis, including sequence alignment and sequence similarity search using BLAST, FASTA, CLUSTAL W and CLUSTAL X (4 hrs)
CO8	Understand molecular phylogenetics and tools and methods for construction of phylogenetic trees (3 hrs)
CO9	Explain genome sequencing technologies, functional genomics, proteomic technologies and molecular docking and drug design (9 hrs)

SEMESTER 6

GZOL6B10T – PHYSIOLOGY AND ENDOCRINOLOGY

Credits: 3

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Describe the regulation of digestion in man, nutrition in pregnancy and infancy, nutritional disorders, balanced diet, starvation, fasting and obesity. (5 hrs)
CO2	Understand the mechanism of transport and exchange of respiratory gases and its neurophysiological control and physiological problems in diving mammals, new-born and aged individuals. (6 hrs)
CO3	Describe functions, composition, coagulation, transfusion, agglutination and clinical analysis of blood, haemoglobinopathies, types of heart and common cardio-vascular problems. (6 hrs)
CO4	Understand the osmoregulatory mechanisms in animals; excretion and its hormonal control and common renal disorders in man. (6 hrs)
CO5	Explain the ultrastructure of skeletal muscles and biochemical events and energetics of muscle contraction. (5 hrs)
CO6	Understand the different types of nerve cells, glial cells and nerve fibres, and the mechanism of nerve impulse transmission (6 hrs)
CO7	Understand the types, physiology and significance of bioluminescence, and the structure and functions of electric organs. (2 hrs)
CO8	Describe invertebrate neuro-endocrine organs and hormones, vertebrate endocrine glands, their hormones and functions (12 hrs)
CO9	Understand the concept of neurosecretion and the mode of action of peptide and steroid hormones. (6 hrs)

SEMESTER 6

GZOL6B11T – REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY

Credits: 3

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Explain the reproductive strategies in invertebrates and vertebrates and structural and functional features of human reproductive system (6 hrs)

CO2	Describe process of fertilization, pregnancy, gestation, placentation, parturition and lactation in humans. (3 hrs)
CO3	Explain the scope of reproductive technologies in infertility management; prenatal diagnostic techniques and methods of fertility control (5 hrs)
CO4	Understand the phases and theories of development, and classification of eggs (3 hrs)
CO5	Enumerate the types of cleavage, arrangement of blastomeres, germ layers and their derivatives, cell lineage in Planocera and different types of blastula. (3 hrs)
CO6	Illustrate the early developmental process of egg in <i>Amphioxus</i> , frog, chick and man (22 hrs)
CO7	Explain the basics of cell differentiation and its genetic control, stem cells and applications of stem cell technology (3 hrs)
CO8	Describe parthenogenesis, types, and significance (2 hrs)
CO9	Explain fate map construction, Spemann's constriction experiments on amphibian embryos, organizers in development, embryonic induction, gradient experiments in sea urchin eggs, cloning experiments in sheep and teratogenesis (7 hrs)

SEMESTER 6

GZOL6B12T – ENVIRONMENTAL AND CONSERVATION BIOLOGY

Credits: 3

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Explain the structure of ecosystem and its functioning through energy flow and nutrient cycling (6 hrs).
CO2	Enumerate biogeochemical cycles and understand the concept of limiting factors (5 hrs).
CO3	Describe the ecology of population, community and habitat as a self regulating system (14 hrs)
CO4	Understand various types of population interactions and appraise the co-evolution (3 hrs).
CO5	Comprehend the diverse environmental and sustainability challenges ranging from local to global and the establishment of perfect harmony between economic development, social issues and environmental conservation (4 hrs).
CO6	Enumerate the several tools and techniques employed for studies on populations, communities and ecosystems. (4 hrs)
CO7	Understand the threats to biodiversity, and strategies adapted for the conservation of diversity of organisms (10 hrs)
CO8	Describe the various international strategies for conserving biodiversity (4 hrs)
CO9	Describe the toxic chemicals, their toxicity levels and the health hazards caused by them (4 hrs).

SEMESTER 6
GZOL6B13T – ETHOLOGY, EVOLUTION AND
ZOOGEOGRAPHY

Credits: 3

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Describe the patterns and mechanisms of animal behaviour (5 hrs)
CO2	Illustrate biological rhythms and the chemical basis of communication (7 hrs)
CO3	Identify major evolutionary transitions over time, and explain the tools and evidences that support current hypotheses of the history of life on earth (8 hrs)
CO4	Describe the evidences for evolution and its required corollaries (5 hrs)
CO5	Explain the various theories of evolution (6 hrs)
CO6	Describe the mechanisms by which evolution occurs (5 hrs)
CO7	Recognize the significance of reproductive isolation in reducing gene flow between populations, biological and morphological species concepts and distinguish between prezygotic and postzygotic barriers to reproduction (7 hrs)
CO8	Review the events in human evolution (3 hrs)
CO9	Explain ecological and historical foundations for understanding the distribution and abundance of species, and their changes over time and comprehend the basic principles of biogeography as a discipline (8 hrs)

ELECTIVE
SEMESTER 6
GZOL6E01T -- HUMAN GENETICS

Credits: 3

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Explain the characteristics, nomenclature and classification of human chromosomes; non-disjunction of chromosomes and the phenotypic effects of chromosome structural modifications (16 hrs)
CO2	Understand the construction of pedigrees of Sex-linked and Autosomal dominant and recessive gene mutation disorders and presentation of molecular genetic data in pedigrees (4 hrs)
CO3	Enumerate the major autosomal and X-linked dominant and recessive human genetic disorders (8 hrs)
CO4	Explain multifactorial inheritance (4 hrs)

CO5	Understand the basic genetics of reproduction and development (9 hrs)
CO6	Explain the prenatal diagnostic techniques, major genetic services and genetic counseling (9 hrs)
CO7	Describe human genetic variations, archaeogenetics of South Asia and genetic origin of Indian populations (4 hrs)

SEMESTER 6

GZOL6B14P – ZOOLOGY CORE PRACTICL - II

Practical II*A + Practical II*B

**PRACTICAL II*A: CELL BIOLOGY, GENETICS, BIOTECHNOLOGY,
MICROBIOLOGY AND IMMUNOLOGY**

**PRACTICAL II*B: BIOCHEMISTRY, MOLECULAR BIOLOGY,
METHODOLOGY IN SCIENCE, BIOSTATISTICS & BIOINFORMATICS**

Credits: 4

Contact Hours: 144 Hrs (8 Hrs/Week)

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Perform experiments in cell biology and genetics including demonstration of Barr body in buccal epithelial cells of man, polytene chromosome in the salivary glands of <i>D. melanogaster</i> larva, mitotic division in onion root tip cells, micrometry of microscopic objects, prepare whole mounts of microscopic objects, and calculate mitotic and metaphase index from slides.
CO2	Enumerate the inheritance of major human genetic traits, pedigree chart, normal and abnormal human karyotypes, phenotypic differences of male and female <i>Drosophila</i> and solve problems on Monohybrid, dihybrid crosses, blood groups and sex-linked inheritance.
CO3	Understand electrophoresis, PCR, Northern blotting, Southern blotting and Western blotting, DNA sequencing and fingerprinting and isolation of genomic DNA.
CO4	Perform gram staining and preparation of culture media for bacteria and demonstrate bacterial motility by standard laboratory protocols.
CO5	Understand the detection of human blood groups and organs of immune system
CO6	Perform standard biochemical tests for the detection of reducing and nonreducing sugars, polysaccharides, proteins and lipids.
CO7	Understand the staining of mitochondria, tissue homogenization and isolation of nuclei, effect of colchicines on cell division, extraction of DNA and polyacrylamide and agarose gel electrophoresis
CO8	Solve basic problems in biostatistics and Bioinformatics

SEMESTER 6

GZOL6B16P – ZOOLOGY CORE PRACTICAL – III

Practical III*A + Practical III*B

PRACTICAL III*A: PHYSIOLOGY, ENDOCRINOLOGY,
REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY

PRACTICAL III*B: ENVIRONMENTAL AND CONSERVATION
BIOLOGY, ETHOLOGY, EVOLUTION, ZOOGEOGRAPHY & ELECTIVE
COURSE

Credits: 4

Contact Hours: 144 Hrs (8 Hrs/Week)

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Perform standard laboratory experiments for the estimation of Hb, presence of hCG/abnormal constituents in urine, detection of blood pressure, bleeding and clotting time and identification of formed elements in blood (46 hrs)
CO2	Identify selected stages in the development of frog and chick and chosen larval forms of invertebrates and vertebrates (26 hrs)
CO3	Carry out experiments of laboratory standards to estimate water quality parameters including, dissolved Oxygen, Carbon dioxide, hardness and pH; determination of adulteration of selected food items and identify marine planktons and soil organisms (28 hrs)
CO4	Demonstrate the behavioural response of earthworm/dipteran larva to selected stimuli (11 hrs)
CO5	Describe homologous, analogous and vestigial organs, connecting links, adaptive radiation and evolution of man (11 hrs)
CO6	Illustrate zoogeographical realms, Wallace line, Weber line, Wallacea and the distribution of <i>Peripatus</i> , lung fishes, <i>Sphenodon</i> , monotremes and marsupials (11 hrs)
CO7	Identify the normal and selected abnormal human karyotypes and inheritance of chosen traits from pedigree charts/describe ornamental and other culture fishes/ describe chosen beneficial and harmful insects (11 hrs)

Open Courses

SEMESTER 5

GZOL5D01T – REPRODUCTIVE HEALTH AND SEX EDUCATION

Credits: 3

Contact Hours: 54 Hrs (3 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the reproductive health, and importance of sex education for teen and youth. (2 hrs)
CO2	Explain the chromosomal mechanism of sex determination and sex chromosomal anomalies. (3 hrs)
CO3	Describe the structural and functional features of human reproductive system, fertilization, implantation, pregnancy, gestation, placenta, parturition and lactation. (17 hrs)
CO4	Explain the scope of reproductive technologies in infertility management and the assisted reproductive techniques. (10 hrs)
CO5	Understand the different methods of prenatal diagnosis and associated ethical issues (4 hrs)
CO6	Describe the different methods of fertility control. (4 hrs)
CO7	Understand the symptoms, mode of transmission, diagnosis and treatment of different sexually transmitted diseases and their socio economic dimensions. (7 hrs)
CO8	Describe sexual orientation, sexual abuse and myths (5 hrs)
CO9	Understand the ethical aspects of sex (2 hrs)

Complimentary Courses

SEMESTER I

GZOL1C01T – ANIMAL DIVERSITY AND WILDLIFE CONSERVATION

Credits: 2

Contact Hours: 36 Hrs (2 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Describe the general characters of protists and salient features of phylum – Rhizopoda, Ciliophora, Dinoflagellata and Apicomplexa (2 hrs)
CO2	Enumerate the salient features and examples of Phylum – Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Onychophora, Mollusca and Echinodermata, and the structural organization of <i>Peneaus</i> sp. (14 hrs)

CO3	Describe the characteristic features and classification of phylum Chordata with examples and, structural organization of <i>Oryctolagus cuniculus</i> (14 hrs)
CO4	Explain levels of biodiversity, threats to biodiversity, biodiversity hotspots, importance and strategies for conservation of wildlife and sustainable development (6 hrs)

SEMESTER 2

GZOL2C02T – ECONOMIC ZOOLOGY

Credits: 2

Contact Hours: 36 Hrs (2 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Explain parasitism and the major protist, cestode, trematode and nematode parasites of man and major insect vectors of human diseases and their control (11 hrs)
CO2	Understand major beneficial and harmful insects, damages caused to host plants and their control measures (14 hrs)
CO3	Understand pisciculture, prawn, mussel and pearl culture (11 hrs)

SEMESTER 3

GZOL3C03T – PHYSIOLOGY AND ETHOLOGY

Credits: 2

Contact Hours: 36 Hrs (2 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Describe the structure of plasma membrane and the various trans-membrane transport mechanisms (3 hrs)
CO2	Enumerate the constituents of normal diet and the mechanism of digestion and absorption of carbohydrates, proteins and lipids and the regulation of gastrointestinal function (4 hrs)
CO3	Explain the mechanism of transport of respiratory gases, control of respiration, respiratory problems and artificial ventilation (6 hrs)
CO4	Explain the structure and working of human heart and mechanism of regulation of heart beat; constituents of human blood and blood transfusion and cardiovascular problems (7 hrs)
CO5	Illustrate the structure of human kidney, the mechanism of urine formation, hormonal control of kidney function and kidney disorders; osmoregulation and urea cycle (6 hrs)
CO6	Enumerate the structure of myofibrils and myofilaments; muscle contractile and regulatory proteins and mechanism of muscle contraction (7 hrs)

CO7	Explain different types of nerve cells and glial cells, maintenance of resting membrane potential, generation and propagation of action potential and synaptic transmission (7 hrs)
CO8	Describe innate behavior, learned behavior, patterns of behavior and factors that affect behavior (8 hrs)
CO9	Enumerate biological rhythms, communication in animals and social organization in mammals (6 hrs)

SEMESTER 4
GZOL4C04T – GENETICS AND IMMUNOLOGY

Credits: 2

Contact Hours: 36 Hrs (2 Hrs/Week)

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Describe human karyotype , chromosomal anomalies and polygenic inheritance (6 hrs)
CO2	Explain the mechanisms of sex determination (4 hrs)
CO3	Enumerate the concept of genes, gene expression, genetic code, transcription and translation (8 hrs)
CO4	Illustrate the mechanism of recombinant DNA technology and its practical applications (13 hrs)
CO5	Explain the types of cancer, causes of transformation and characteristics of transformed cells (5 hrs)
CO6	Identify the cells and organs of immune system, antigens and antibodies (7 hrs)
CO7	Enumerate antigen-antibody interaction, generation of B-cell and T-cell response and major immunotechniques (7 hrs)
CO8	Explain primary and secondary immunodeficiency diseases, autoimmune diseases, vaccination and vaccines (4 hrs)

SEMESTER 1, 2, 3 & 4
GZOL4C05P – ZOOLOGY COMPLEMENTARY PRACTICAL
Practical I*A+I*B+I*C+I*D

Credits: 4

Contact Hours: 144 Hrs (8 Hrs/Week)

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Identify the salient features of the phylum; taxonomic position, habit, habitat, adaptations/importance of selected protists, non-chordates and chordates (36 hrs)
CO2	Describe major human parasites and economically important insects, molluscs and fishes (36 hrs)

CO3	Perform detection of human blood groups and prepare human blood smear as per laboratory standards; mounting of specialized organs of selected non-chordates and chordates, and demonstrate the presence of biomolecules in samples by standard laboratory protocols (36 hrs)
CO4	Illustrate the normal and selected abnormal human karyotypes and mode of inheritance of selected human genetic disorders and perform the dissection of earthworm and sardine to demonstrate the alimentary canal and <i>Panaeus</i> to demonstrate the nervous system (36 hrs)