



ST. THOMAS COLLEGE (AUTONOMOUS)
THRISSUR, KERALA - 680 001

College with Potential for Excellence
NIRF INDIA Ranking 2021 : 64th

www.stthomas.ac.in

PROGRAMME OUTCOMES
PROGRAMME SPECIFIC OUTCOMES
COURSE OUTCOMES

B.Sc Zoology

OUTCOMES:

At the end of Under Graduate Program at St. Thomas College (Autonomous), a student will have obtained:

PO1	Critical Thinking: Ability to take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives
PO2	Effective Communication: Ability to speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
PO3	Effective Citizenship: Ability to demonstrate empathetic social concern and equity-centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering
PO4	Environment and Sustainability: Ability to understand the issues of environmental contexts and sustainable development
PO5	Ethical Living: Ability to recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them
PO6	Social Interaction: Ability to elicit views of others, mediate disagreements and help reach conclusions in group settings
PO7	Problem Solving and Analytical Skills: Ability to think rationally, analyze situations and solve problems adequately

PROGRAM SPECIFIC OUTCOMES:

At the end of B.Sc Zoology at St. Thomas College (Autonomous), Thrissur, a student will have developed:

PSO1	Understand the biological diversity and grades of complexity of various animal forms through their systematic classification and the process of organic evolution.
PSO2	Understand the roles of plants, animals and microbes in the sustainability of the environment and their interaction among themselves and deterioration of the environment due to anthropogenic activities.
PSO3	Understand the concepts and principles of biochemistry, immunology, physiology, ethology, evolution, and environmental biology endocrinology, developmental biology, cell biology, genetics, and entomology, molecular biology and microbiology and develop technical skills in biotechnology, bioinformatics and biostatistics.
PSO4	Perform laboratory procedures as per standard protocols in the areas of animal diversity, systematics, cellbiology, genetics, biochemistry, molecular biology, microbiology, physiology, immunology, developmental biology, environmental biology, ethology, entomology evolution and science methodology,

COURSE OUTCOMES:

B.Sc. Zoology

ZOL1B01T - ANIMAL DIVERSITY: NON-CHORDATA PART- I

At the end of this course, a student will have developed ability to:

CO1	Understand the principles and concepts of classification and nomenclature.
CO2	Comprehend the classification with examples and characteristic features of kingdom Protista and memorize the morphology and structural organization of Paramecium.
CO3	Identify the characteristic features of subkingdom Mesozoa .
CO4	Classify phylum Porifera and understand salient features of each class.
CO5	Understand the characteristic features of phylum Cnidaria and Ctenophora, classify phylum Cnidaria down to classes and remember the structural organization of Obelia sp.
CO6	Recognise the salient features of phylum Platyhelminthes and its classification down to classes.
CO7	Remember the characteristic features and classification of super-phylum Aschelminthes and phylum Nematoda
CO8	Generalize the characters of Pseudocoelomate minor phyla Rotifera and Gastrotricha

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ZOL2B02T - ANIMAL DIVERSITY: NON-CHORDATA PART – II

At the end of this course, a student will have developed ability to:

CO1	Understand the classification with examples and characteristic features of phylum Annelida and comprehend the morphology and structural organization of Nereis.
CO2	Analyse the distribution, peculiarities and affinities of phylum Onychophora.
CO3	Comprehend the classification of phylum Arthropoda; remember the salient features of each class and memorize the morphology and structural organization of Penaeus.
CO4	Understand the characteristic features of phylum Mollusca, classify down to classes and recognise the structural organization of Pila globosa
CO5	Recognise the salient features of phylum Echinodermata and classify down to classes.
CO6	Understand the salient features and affinities of phylum Hemichordata.
CO7	Memorise the characters of coelomate minor phyla Phoronida, Ectoprocta and Echiura

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ZOL3B03T - ANIMAL DIVERSITY: CHORDATA PART - I

At the end of this course, a student will have developed ability to:

CO1	Understand the characteristics of chordates and classify the phylum Chordata.
CO2	Recognise the salient features and affinities of subphylum Urochordata and classify down to classes; memorize the morphology and structural organization of Ascidia..
CO3	Comprehend the salient features and affinities of subphylum Cephalochordata with reference to Branchiostoma.
CO4	Generalize the salient features of subphylum Vertebrata, classify down to classes and discuss the characteristics of division Agnatha.
CO5	Remember the salient features of superclass Pisces and its classification down to orders and the morphology and structural organization of Mugil cephalus.
CO6	Comprehend the salient features and affinities of class Amphibia and classify up to orders; understand the morphology and organ systems of Hoplobatrachus tigerinus.
CO7	Memorise the characteristic features of the class Reptilia and classify down to orders; understand the morphology and organ systems of Calotes versicolor.

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ZOL4B04T- ANIMAL DIVERSITY: CHORDATA PART-II

At the end of this course, a student will have developed ability to:

CO1	classify class Aves down to orders with salient features of each order with suitable examples.
CO2	Understand the external characters and functional systems of <i>Columba livia</i>
CO3	Recognise the salient features and classify class Mammalia down to orders with suitable examples.
CO4	Remember the external characters and functional systems of <i>Oryctolagus cuniculus</i>
CO5	Compare the circulatory, excretory and nervous systems of vertebrates

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ZOL4B05P - CORE COURSE PRACTICAL – I: ANIMAL DIVERSITY

At the end of this course, a student will have developed ability to:

CO1	Identify and understand specified protists and acoelomate & pseudocoelomate non-chordates and perform the culture of selected protists; understand the histological features of coelenterate, platyhelminth and nematode.
CO2	Identify and understand specified coelomate non-chordates and the transverse sections of annelids; Perform mounting of the specified organs of selected non-chordates.
CO3	Identify and understand specified chordates and specified bones of chordates; construct key for identification of venomous snakes; Perform mounting and dissection of specified organ systems of chordates
CO4	Identify and understand selected vertebrates and specified bones of vertebrates.

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ZOL5B06T - CELL BIOLOGY & GENETICS

At the end of this course, a student will have developed ability to:

CO1	Understand the principles and applications of various types of microscopes and the processing of tissues for histological and histochemical analysis.
CO2	Recognize the basic structure of a eukaryotic cell and the structure and functions of plasma membrane, mitochondria, lysosome, cytoskeletal elements and interphase nucleus.
CO3	Understand the structure of chromosomes and giant chromosomes and different levels of organization of chromatin.
CO4	Comprehend eukaryotic cell cycle and cell division by mitosis and meiosis and the role of protooncogenes and tumor suppressor genes in cancer; mechanism and significance of apoptosis.
CO5	Understand the different types of allelic and non-allelic gene interactions; characteristics of linkage groups and linkage map; significance of sex linked characters and sexual disorders
CO6	Compare the different mechanisms of sex determination; the hormonal and environmental influence on sex determination; intersex and gynandromorphism.
CO7	Remember mutagenesis, mutagens and different types of chromosomal and gene mutations; significance of mutations in speciation.
CO8	Understand the classification and grouping of human chromosomes; human autosomal and sex chromosomal anomalies; polygenic human traits and genetic counseling

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ZOL5B07T - BIOTECHNOLOGY, MICROBIOLOGY & IMMUNOLOGY

At the end of this course, a student will have developed ability to:

CO1	Understand the steps in genetic engineering and animal cell culture.
CO2	Recognise the applications of biotechnology, transfection methods, transgenic animals and ethical issues of transgenic animals.
CO3	Understand the biological diversity of microbes and the various techniques for handling microbes.
CO4	Comprehend the basic structure and life cycle of bacteria and virus.
CO5	Recognize the industrial and medical importance of microorganisms
CO6	Analyse the different types of immunity and the cells and organs of the immune system
CO7	Recognise antigen, antibody, immunity and major histocompatibility complex
CO8	Understand autoimmune and immunodeficiency diseases and immunology of tumor and organ transplantation

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ZOL5B08T - BIOCHEMISTRY & MOLECULAR BIOLOGY

At the end of this course, a student will have developed ability to:

CO1	Understand how life works in a fundamental way--immense and indispensable daily life activities Its application used in clinical diagnosis, manufacture of various biological products, treatment of diseases, in nutrition, agriculture, etc.
CO2	Understand the metabolic processes by which energy is produced in cells and carbohydrates are synthesized and their biological roles
CO3	Recognise the properties and classification of amino acids and their standard abbreviations;hierarchical levels of protein structure and their biological role , properties of enzymes; enzyme action, co-enzymes, cofactors, isozymes, ribozymes and allosteric enzymes role of enzymes in metabolism
CO4	Understand the metabolism of lipids, purines and pyrimidines, andclassification, and its biological roles structure of nucleic acids and the classification, nomenclature
CO5	Understand the concept of gene; genetic code and genome organization
CO6	Analyse the role and mechanism of DNA replication and transcription
CO7	Understand the mechanism of translation
CO8	Comprehend Regulation of gene expression

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ZOL5B09T - METHODOLOGY IN SCIENCE, BIostatISTICS AND BIOINFORMATICS

At the end of this course, a student will have developed ability to:

CO1	Understand the scientific method & interdisciplinary approach.
CO2	Understand the different process of experimentation.
CO3	Understand the ethical concerns in practicing science .
CO4	Understand the process of sampling and diagrammatic representation.
CO5	Apply basic descriptive and inferential statistical tests.
CO6	Identify major biological databases and database search engines.
CO7	Understand the methods of DNA and protein sequence analysis, including sequence alignment and sequence similarity search; molecular phylogenetics and its tools .
CO8	Identify genome sequencing technologies, functional genomics, proteomic technologies;molecular docking and drug design .

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**ZOL6B15P –[PRACTICAL II*A] CELL BIOLOGY, GENETICS, BIOTECHNOLOGY, MICROBIOLOGY & IMMUNOLOGY
(PRACTICAL II*B] BIOCHEMISTRY, MOLECULAR BIOLOGY, METHODOLOGY IN SCIENCE, BIOSTATISTICS & BIOINFORMATICS**

At the end of this course, a student will have developed ability to:

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 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 of cell division, extraction of DNA and polyacrylamide and agarose gel electrophoresis
CO8	Solve basic problems in biostatistics and Bioinformatics

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ZOL5D02T- REPRODUCTIVE HEALTH AND SEX EDUCATION

At the end of this course, a student will have developed ability to:

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 ethics (7 hrs)

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ZOL5D03T - APPLIED ZOOLOGY

At the end of this course, a student will have developed ability to:

CO1	List and describe the pests and vectors, their habits, damages and control measures and mechanisms of insect pest management. (18 hrs)
CO2	Develop personal, academic, employability and self-management skills in apiculture, lac-culture, sericulture and vermiculture (11 hrs)
CO3	Demonstrate an understanding of the various strategies in pisciculture, prawn culture, mussel culture and pearl culture (4 hrs)
CO4	Recognize the significance of poultry farming and its economic implications in rural India (6 hrs)
CO5	Reviews Indian breeds of cattle and goats and the strategies in their breeding (6 hrs)
CO6	Recognize the significance of parasitic mode of life and their implications in human health (9 hrs)

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ZOL6B10T - PHYSIOLOGY AND ENDOCRINOLOGY

At the end of this course, a student will have developed ability to:

CO1	Comprehend the regulation of digestion in man, nutrition in pregnancy and infancy, balanced diet, starvation, fasting and nutritional disorders.
CO2	Understand the mechanism of transport and exchange of respiratory gases and physiological problems in diving mammals, new-born and aged individuals.
CO3	Understand coagulation, transfusion, agglutination and clinical analysis of blood, types of heart and common cardio-vascular problems.
CO4	Understand the osmoregulatory mechanisms in animals; excretion and its hormonal control and common renal disorders in man.
CO5	Recognize the ultrastructure of skeletal muscles and biochemical events and energetics of muscle contraction.
CO6	Identify different types of nerve cells, glial cells and nerve fibres, and the mechanism of nerve impulse transmission, physiology and significance of bioluminescence and electric organs
CO7	Comprehend invertebrate neuro-endocrine organs and vertebrate endocrine glands, their hormones, functions and disorders.
CO8	Understand the concept of neuro secretion and the action of peptide and steroid hormones.

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ZOL6B11T - REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY

At the end of this course, a student will have developed ability to:

CO1	Understand the reproductive strategies in invertebrates and vertebrates and structural and functional features of human reproductive system.
CO2	Comprehend process of fertilization, pregnancy, gestation, placentation, parturition and lactation in humans.
CO3	Discuss the scope of reproductive technologies in infertility management; prenatal diagnostic techniques and methods of fertility control.
CO4	Understand the phases and theories of development, and classification of eggs, and Describe parthenogenesis, types, and significance.
CO5	Enumerate the types of cleavage, arrangement of blastomeres, germ layers and their derivatives, cell lineage in Planocera and different types of blastula.
CO6	Record the early developmental process of egg in Amphioxus, frog, chick and man
CO7	Understand the basics of cell differentiation and its genetic control, stem cells and applications of stem cell technology
CO8	Analyze 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

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ZOL6B12T - ENVIRONMENTAL AND CONSERVATION BIOLOGY

At the end of this course, a student will have developed ability to:

CO1	Deduce the structure of ecosystem and its functioning through energy flow and nutrient cycling.
CO2	Enumerate biogeochemical cycles and understand the concept of limiting factors.
CO3	Perceive the ecology of population, community and habitat as a self-regulating system and various types of population interactions and appraise the co-evolution.
CO4	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
CO5	Enumerate the several tools and techniques employed for studies on populations, communities and ecosystems.
CO6	Understand the strategies adopted for the conservation of diversity of organisms
CO7	Memorize the various international strategies for conserving biodiversity.
CO8	Generalize the toxic chemicals, their toxicity levels and the health hazards caused by them.and the disaster with special emphasis on endosulphan tragedy.

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ZOL6B13T - ETHOLOGY, EVOLUTION AND ZOOGEOGRAPHY

At the end of this course, a student will have developed ability to:

CO1	Understand the patterns and mechanisms of animal behaviour.
CO2	Perceive biological rhythms and the chemical basis of communication.
CO3	Identify major evolutionary transitions over time, and explain the tools and evidences that support current hypotheses of the history of life on earth .
CO4	Comprehend the various theories of evolution.
CO5	Comprehend the mechanisms by which evolution occurs .
CO6	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
CO7	Review the events in human evolution .
CO8	Generalize the 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.

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ZOL6B15(E)03T - APPLIED ENTOMOLOGY

At the end of this course, a student will have developed ability to:

CO1	Memorize the branches and importance of entomology .
CO2	Understand the various interactions between insects and man.
CO3	Identify and remember the lifecycle, damages and control of insect pests of crop plants.
CO4	Understand the damages and control of plantation crops.
CO5	Understand the damages and control of insect pests of fruits and vegetables.
CO6	Understand the damages and control of insect pests of stored products and domestic animals.
CO7	Review the insect control strategies .
CO8	List and elaborate the useful insects and the products derived from bees, silkworms and lac insects.

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ZOL6B16P - PRACTICAL III*A] PHYSIOLOGY, ENDOCRINOLOGY, REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY [PRACTICAL III*B] ENVIRONMENTAL AND CONSERVATION BIOLOGY, ETHOLOGY, EVOLUTION, ZOOGEOGRAPHY & ELECTIVE COURSE

At the end of this course, a student will have developed ability to:

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 .
CO2	Identify selected stages in the development of frog and chick and chosen larval forms of invertebrates and vertebrates .
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 .
CO4	Visualize the behavioural response of earthworm/dipteran larva to selected stimuli.
CO5	Understand homologous , analogous and vestigial organs, connecting links, adaptive radiation and evolution of man.
CO6	Generalize zoogeographical realms, Wallace line, Weber line, Wallacea and the distribution of Peripatus, lung fishes, Sphenodon, monotremes and marsupials .
CO7	Identify the normal and selected abnormal human karyotypes and inheritance of chosen traits from pedigree charts, ornamental and other culture fishes and chosen beneficial and harmful insects .

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ZOL1C01T- ANIMAL DIVERSITY AND WILDLIFE CONSERVATION

At the end of this course, a student will have developed ability to:

CO1	Understand the general characters of unicellular organisms and salient features of different Phyla – Rhizopoda, Ciliophora, Dinoflagellata and Apicomplexa
CO2	Enumerate the salient features and examples of Phyla – Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Onychophora, Mollusca and Echinodermata,
CO3	Describe the structural organization and various systems of Peneaus sp.
CO4	Describe the characteristic features and classification of phylum Chordata with examples
CO5	Describe the structural organization and various systems of Oryctolagus cuniculus
CO6	Explain levels of biodiversity, threats to biodiversity, biodiversity hotspots, importance and strategies for conservation of wildlife and sustainable development

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ZOL2C02T- ECONOMIC ZOOLOGY

At the end of this course, a student will have developed ability to:

CO1	Understand the major parasites, hosts and modes of infection.
CO2	Understand the major parasites of man and major insect vectors of human diseases and their control
CO3	Identify major harmful insects, damages caused to host plants and their control measures
CO4	Identify major beneficial insects and their economic significance
CO5	Understand the importance of prawn, mussel and pearl culture
CO6	Understand the importance of pisciculture and ornamental fishes

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ZOL3C03T- PHYSIOLOGY AND ETHOLOGY

At the end of this course, a student will have developed ability to:

CO1	Describe the structure of plasma membrane and various trans-membrane transport mechanisms.
CO2	Understand the constituents of normal diet, mechanism of digestion, absorption of biomolecules and illustrate the mechanism of respiration and respiratory disorders.
CO3	Comprehend the structure and working of human heart, regulation of heart beat, constituents of human blood, blood transfusion and cardiovascular disorders.
CO4	Illustrate the structure of human kidney, the mechanism of urine formation, hormonal control of kidney function and kidney disorders.
CO5	Explain the structure of muscle fibre, mechanism of muscle contraction and associated muscle physiology.
CO6	Understand different types of nerve cells and glial cells, maintenance of resting membrane potential, generation and propagation of action potential and synaptic transmission
CO7	Describe innate behavior, learned behavior, patterns of behavior and factors that affect behavior
CO8	Evaluate the importance of biological rhythms, communication in animals and social organization in mammals

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ZOL4C04T- GENETICS AND IMMUNOLOGY

At the end of this course, a student will have developed ability to:

CO1	Understand human karyotype , chromosomal anomalies and polygenic inheritance
CO2	Explain the mechanisms of sex determination in animals
CO3	Describe the concept of genes, gene expression, genetic code, transcription and translation
CO4	Illustrate the mechanism of genetic engineering and its practical applications, advantages and potential hazards.
CO5	Explain different types of cancer, causes of cell transformation and characteristics of cancer cells.
CO6	Identify the cells and organs of immune system, different types of antigens and mode of action of antibodies
CO7	Understand antigen-antibody interaction, generation of B-cell and T-cell responses and major immunotechniques
CO8	Comprehend primary and secondary immunodeficiency diseases, autoimmune diseases, vaccination and vaccines

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ZOL4C05P - PRACTICAL

At the end of this course, a student will have developed ability to:

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>Penaeus</i> to demonstrate the nervous system (36hrs)