

**DEPARTMENT OF ZOOLOGY
BETHUNE COLLEGE**

PROGRAM SPECIFIC OUTCOMES (PSO) AND COURSE OUTCOMES (CO)

Programme: M.Sc. Zoology (CBCS) under University of Calcutta

Year of Introduction: 2018

Program Specific Outcomes (PSO):

PSO1: Understand the nature and basic concepts of cell biology, genetics, biochemistry, taxonomy, physiology, and endocrinology.

PSO2: Understand and analyse the ecological and evolutionary significance of different taxa of animals.

PSO3: To analyse the mechanisms involved in life processes upto the molecular level.

PSO4: To perform the analytical experiments in various fields of biological science.

PSO5: Gains knowledge about research methodologies, effective communication and skills of problem solving methods.

PSO6: At the end of this course, the students are likely to possess expertise which will provide them competitive advantage in pursuing higher studies from India or abroad; and seek jobs in academia, research or industries. Students will be able to define and explain major concepts in the biological sciences. They are able to correctly use biological instrumentation and proper laboratory techniques.

PSO7: Students have the option to go for research work after which they can join as scientist or assistant professor or assistant teacher and can even look for professional job oriented courses, such as Indian Civil Services, Indian Forest Service, Indian Police Service etc.

COURSE OUTCOMES (CO)

SEMESTER-1

ZCT 101- Invertebrate Functional Forms and Adaptations

CO1: Discuss evolution of metazoans, invertebrate feeding.

CO2: Identify the biological and medicinal importance of different sponges.

CO3: Analyze the mechanics of invertebrate movement/ locomotion; muscular activity and skeletal system; invertebrate swimming and flight.

CO4: Discuss on their physiology like defense, thermoregulation, reproductive processes, organization of nervous system etc.

CO5: Interpret the language of insect communication, chemical mimicry in insects.

ZCT 102- Ecological Theories

CO1: Understanding the concept of population ecology, community and behavioural ecology.

CO2: Appraise ecological crises and management as well as ecological economics.

ZCT 103- Cell Biology

CO1: Understanding the concept of different cell-organelles, structure and function of animal tissues.

- CO2: Discuss cell-cycle and cell-signalling, apoptosis and anoikis.
- CO3: Describe stains and dyes, their physical & chemical classification, nomenclature, mordants, metachromasia.
- CO4: Knowledge on tools and techniques in cell biology.

ZCT 104 – Genetics

- CO1: Understanding chromatin dynamics, DNA replication and regulation.
- CO2: Discuss regulation of gene expression, translation & post translational events, recombination & repair, microbial genetics.
- CO3: Describe transposable genetic elements and somatic cell genetics.

ZCP 105- Laboratory Course for Core Subjects

- CO1: Hands-on training in dissection and mounting of different systems of insects.
- CO2: Study of comparative anatomy through models.
- CO3: Analysis of habitats and communities.
- CO4: Study of *Drosophila* genetic crosses, preparation of polytene chromosome, karyotyping.
- CO5: Hands-on training in tissue fixation, microtomy and double staining of tissue sections.

SEMESTER-2

ZCT 206 - Vertebrate Functional Forms and Adaptations

- CO1: Examine the structure and function of proto-chordates, chordates and their physiology.
- CO2: Discuss structural adaptation.

ZCT 207 - Developmental Biology & Neurobiology

- CO1: Recall the Principles of developmental biology including embryogenesis.
- CO2: Discuss epigenetic regulation of developmentally relevant genes.
- CO3: Describe metamorphosis and organogenesis in model organisms like *Drosophila*.
- CO4: Explain cellular and molecular aspects of regenerative biology.
- CO5: Describe the role of stem cells in neurogenesis; neuronal ageing and death.
- CO6: Analyze the detailed mechanism of neurophysiology, aspects of neuronal disorders.

ZCT 208 - Biochemistry and Genetic Engineering

- CO1: Attain the knowledge of biomolecules like carbohydrates, proteins, lipids, amino acids.
- CO2: Analyze the metabolic pathways of the major biomolecules with mention of rate limiting steps
- CO3: Describe enzymes and comprehend the concept of bioenergetics.
- CO4: Discuss free radicals and anti-oxidants.
- CO5: Implement Genomics, Proteomics & Bioinformatics.
- CO6: Adapt recombinant DNA technology, gene therapy and pharmacogenomics; molecular techniques.

ZCT 209- Parasitology and Immunology

- CO1: Understand human clinical and veterinary parasitology.
- CO2: Discuss host parasite interaction, community medicine, vector biology.
- CO3: Explain the genome organization and molecular basis of antigenic variation in *Plasmodium*.

CO4: Discuss immunobiology of invertebrates.

CO5: Distinguish innate immunity, cell mediated immunity and humoral immunity.

CO6: Assess the mechanism of antigens capture and presentation, antigen recognition by B cell and T cell receptor complex.

CO7: Understand the concept of disease immunobiology.

ZCP 210- Laboratory Course for Core Subjects

CO1: Hands on training in morphometric analyses of herbivorous and carnivorous fishes.

CO2: Study of adaptive features from morphology of preserved specimen.

CO3: Comparative study of Accessory Respiratory Organ in fish models; study of olfactory apparatus in *Oreochromis sp*

CO4: Estimation of glucose, total protein from tissues of animal model.

CO5: Hands on training in DNA isolation and other allied techniques.

CO6: Study of developmental stages and fin regeneration in Zebra fish.

CO7: Identification and demonstration of primary and secondary lymphoid organ; haemagglutination.

SEMESTER-3

ZCT 311- Conservation biology

CO1: Understand the concept of conservation biology.

CO2: Describe the process and pattern of biodiversity.

CO3: Discuss climate change and biodiversity.

CO4: Appraise the concept of conservation at genetic levels.

CO5: Distinguish conservation of populations, habitats and landscape.

CO6: Analyze selection, designing and management of protected areas.

ZCT 312- Endocrinology & Comparative Animal Physiology

CO1: Explain the molecular basis and therapeutics of the metabolic disorders associated with pituitary, pancreas and thyroid gland.

CO2: Discuss GI tract hormones, thymic hormones and cell immunity; pineal gland; pheromones.

CO3: Discuss and explain physiological homeostasis, thermal physiology, physiology of excretion, circulation and respiration.

CO4: Knowledge on insect sociality and physiology, insect –plant interaction.

Elective Papers

ZET- 315- Environmental Biology and Toxicology

CO1: Discuss environmental impact assessment and environmental biomonitoring.

CO2: Knowledge on semiochemistry of plant- animal interaction.

CO3: Discuss environmental contamination and endocrine disruption.

CO4: Describe toxin, xenometabolism, response relationships and toxicokinetics.

CO5: Analyze the working principles of some instruments used in toxicology.

ZET – 318- Applied Entomology

CO1: Identify and categorize agricultural entomology, physiological entomology, ecological entomology, behavioural entomology, functional entomology, economic entomology, forensic and medical entomology.

CO2: Knowledge on insect toxicology.

ZET- 319-Wild Life Biology and Conservation

CO1: Discuss wildlife habitat ecology, behavioural biology of wild animals, wildlife tools and techniques.

CO2: Concept building on capture and management of wildlife.

CO3: Learning captive breeding knowhow of wildlife.

CO4: Investigate the ways of minimizing Human-Wildlife conflict.

CO5: Building awareness among common people about Wildlife Crime and legislation.

CO6: Learning and application of knowledge of case studies for conservation of wildlife.

ZET – 324- Genetics of human diseases

CO1: Understand the concept of monogenic and polygenic diseases, mitochondrial inheritance and diseases.

CO2: Discuss genetic polymorphisms.

CO3: Analyze the genetics of some common human diseases.

CO4: Discuss the concept of, applications of bioinformatics and genetic counseling.

ZET- 326- Applied Immunology

CO1: Concept building on infection and immunity, hypersensitivity, tolerance and autoimmunity, tumour and transplantation.

CO2: Explain immunology, immunodeficiency and immunoprophylaxis.

SEMESTER-4

ZCT 429- Taxonomy & Biostatistics

CO1: Concept building on taxa, species, Phylogenetic reconstruction and associated statistics.

CO2: Ability to identify data relating to variable/variables.

CO3: Apply hypothesis testing via some of the statistical distributions.

CO4: Arrange the results of the hypothesis testing and make a statistical decision.

ZCT 430- Animal Behavior and Evolutionary Biology

CO1: Introduction to cooperation and conflict, foraging, aggression.

CO2: Discuss natural selection and adaptation and evolutionary process.

CO3: Analyze gene frequencies in population and patterns and trends in evolution.

CO4: Discuss the genetic basis of speciation.

ZCP 431- Laboratory course for core subjects

CO1: Hands on training in specimen collection and preservation techniques, preparation of key.

CO2: Statistical assessment of morphometry using software, tools of bioinformatics.

CO3: Hands on training in comparative haematological profiling and nutritional and gastrointestinal profiling from invertebrate and vertebrate models.

CO4: Formulate general management protocol of mammalian experiments, animal ethics standards and measures.

CO5: Demonstration of some instruments for advanced and precise biological methods.

ZCP 432 - Comprehensive viva voce + Field Study & report

CO1: To assess overall knowledge.

ZEP 433- a)Lab internship and Dissertation b)Seminar on dissertation

CO1: Based on Project work.

Choice Based Credit Courses:**BEGM-GE31: CBCCA- Environmental Microbiology**

CO1: Basic knowledge about environmental and microbes

CO2: Basic idea about environmental vulnerability, disasters and environmental health.

BCM-GE32: CBCC-B6- Fundamentals of Biochemistry-II

CO1: Basic knowledge about biomolecules of metabolic importance.

CO2: Biosynthesis and metabolism of biomolecules.

CO3: Basic idea about bioenergetics.

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