

# **NEHRU MEMORIAL COLLEGE (AUTONOMOUS)**

**NATIONALLY ACCREDITED WITH "A" GRADE BY NAAC**

**PUTHANAMPATTI, TRICHY – 621007**



**DEPARTMENT OF ZOOLOGY**

**PG**

**COURSE OUTCOME (COS)**

<b>Name of the Course</b>	<b>Course Outcomes</b>
<p style="text-align: center;"><b>CC – I: INVERTEBRATA AND CHORDATA</b></p>	<p><b>CO 1:</b> To develop taxonomic experts strength.</p> <p><b>CO 2:</b> Distinguish animal kingdom of various taxonomic forms.</p> <p><b>CO 3:</b> To evaluate mode of living of various taxonomic forms living in various environments.</p> <p><b>CO 4:</b> Reveal the taxonomic and characteristic features of minor phyla and lower metazoans.</p> <p><b>CO 5:</b> Identify the characters of phylum echinoderms and reveal the phylogeny and evolutionary significance of hemichordate.</p>
<p style="text-align: center;"><b>CC – II: CELL AND MOLECULAR BIOLOGY</b></p>	<p><b>CO 1:</b> Discuss the most significant discoveries and theories through the historical progress of biological scientific discoveries, and their impacts on the development of molecular biology.</p> <p><b>CO 2:</b> Compare the structure of eukaryotic cells with the structure of simpler prokaryotic cells and with the structure of viruses.</p> <p><b>CO 3:</b> Explain the fundamental structure, properties and processes in which nucleic acids play a part.</p> <p><b>CO 4:</b> Discuss the molecular mechanisms by which DNA controls development, growth or morphological characteristics of organisms.</p> <p><b>CO 5:</b> Independently execute a laboratory experiment using the standard methods and techniques in molecular biology, with the appropriate analysis and interpretation of results obtained.</p>

**CC-III: GENETICS**

- CO 1:** Chemistry of nucleic acids and inheritance and different experimental evidences to prove DNA and RNA as genetic materials.
- CO 2:** Molecular level genetic of microbial reproduction.
- CO 3:** Genetics of heritage of human and syndromes at molecular level.
- CO 4:** Role of jumping genes and gene mutations at molecular level.
- CO 5:** History and evolution of gene families and human genome project

**CC -IV:  
BIOCHEMISTRY**

- CO 1:** Explain the laws of thermodynamics and describe the intra and inter molecular interaction in biological system
- CO 2:** Explain the structure of atom and molecule and analyze the chemical interaction.
- CO 3:** Describe buffer system in living things.
- CO 4:** Explain biochemical structure and function of biomolecules.
- CO 5:** Describe the mechanism of enzymes activity and relates the structure and function of nucleic acids and Identify the types of nutrients and functions

**CC – V: PRACTICAL – I  
(COVERING CC-I to CC-  
IV)**

- CO 1:** Identification and classification of animals give to improve the knowledge among students to give an idea about new discovery of various taxa.
- CO 2:** The training technique of dissection of invertebrate and vertebrate animals and to understand the various systems present in the body useful for drug design by the students in future.

**CC-VI: IMMUNOLOGY**

- CO 1:** Explain the structure and functions of lymphoid organs and types of immunity.
- CO 2:** Explain the structure, types and properties of antigens and immunoglobulin and analyses the role of gene rearrangement process in antibody diversity.
- CO 3:** Describe the process and mechanism of Humoral and Cell mediated immune response and Complement pathways. Explain and analyses the structure and genetic organization of MHC.
- CO 4:** Explain Organ transplantation and tumour immunology and relates the process of immune tolerance and autoimmunity.
- CO 5:** Exemplify the types of hypersensitivity and explain immune response in microbial infection and to describe Hybridoma technique and its applications.

	<p><b>CO 6:</b> Explain and analyses antigen – antibody reactions, immunodiffusion techniques, ELISA, RIA, Western Blot, IF, Flow cytometry, FISH and GISH.</p>
<p><b>CC-III: ANIMAL PHYSIOLOGY</b></p>	<p><b>CO 1:</b> After the course, the student should be able to be a competent Physiologist.</p> <p><b>CO 2:</b> Conduct such clinical/experimental research as would have significant bearing on human health and patient care.</p> <p><b>CO 3:</b> Acquire skills in conducting collaborative research in the field of physiology &amp; allied sciences.</p> <p><b>CO 4:</b> Must be able to demonstrate to the students how the knowledge of physiology can be used in a variety of clinical settings to solve diagnostic and therapeutic problems.</p> <p><b>CO 5:</b> Encourage the student to participate in various workshops/seminars/journal clubs/ demonstration in the departments, to acquire various skills for collaborative research.</p>

**CC-VIII:  
DEVELOPMENTAL  
BIOLOGY**

- CO 1:** Be able to list the types of characteristics that make an organism ideal for the study of developmental biology.
- CO 2:** Be able to label macromeres, mesomeres, and micromeres and know which cell types are derived from each of these cell layers in the early embryo (e.g. primary and secondary mesenchyme, ectoderm, endoderm, mesoderm).
- CO 3:** Be able to describe the stages and cellular mechanisms (ingression, invagination, convergent extension) of gastrulation in the sea urchin. Be able to describe the functions of gastrulation.
- CO 4:** To develop the skill of observing developing organisms and recording by notes and drawings; to introduce some of the surgical and cellular experimental techniques of developmental biology.
- CO 5:** To give training in analysing primary research papers, and in assessing experimental evidence and its interpretation.

**CC - IX: PRACTICAL II:  
(COVERING CC-VI &  
CC-VIII)**

- CO 1:** Knowledge among students to give an idea about various immunological techniques to be applied for their research work in future.
- CO 2:** Justify various tests to detect the disorders of our body.

	<p><b>CO 3:</b> Describe the role of pH in our body and its impact related to body.</p> <p><b>CO 4:</b> Relates the importance of Hemoglobin in our body.</p> <p><b>CO 5:</b> Assess the reproductive technology and to find out structure of spermatozoa and to compare the type of embryo of lower forms.</p>
<p align="center"><b>EC – I a: MICROBIOLOGY</b></p>	<p><b>CO 1:</b> The students will able to recognize the scope of microbiology.</p> <p><b>CO 2:</b> Narrate the nutrition for bacterial growth and the factors affecting the growth.</p> <p><b>CO 3:</b> Ability to produce fermented products using bacteria.</p> <p><b>CO 4:</b> To emphasise the importance of bioremediation bacteria and its importance to clean the environment which hamper the society in various ways.</p> <p><b>CO 5:</b> To gain knowledge about microbes as disease causing agent in various environment such as soil, water and atmosphere.</p>
<p align="center"><b>EC-I b: WILDLIFE AND CONSERVATION BIOLOGY</b></p>	<p><b>CO 1:</b> To know about various wild animals' status and their importance by reading this course.</p> <p><b>CO 2:</b> To find out the conservation issues and wildlife act to safeguard the various wild animals.</p> <p><b>CO 3:</b> To get information of various sanctuaries and national parks and their importance so as to enable the students to face various competitive exams life IFS.</p>

	<p><b>CO 4:</b> The role NGOs and their importance by carrying out various projects to safe guard the Indian wildlife.</p> <p><b>CO 5:</b> Students get through the employment opportunities in various research institutions and the students able to understand the Indian Wildlife Protection Act (1972).</p>
<p><b>OEC a – MEDICAL ZOOLOGY</b></p>	<p><b>CO 1:</b> To aware the students about personal and public health hygiene.</p> <p><b>CO 2:</b> Analyse the importance of medical care among students in the initial stage and its preventive measures.</p> <p><b>CO 3:</b> Explain the importance of medical care among students.</p> <p><b>CO 4:</b> The students may take care of the society and their family or surrounding against disease causing agents.</p> <p><b>CO 5:</b> Drug design may be attempted by the students in future.</p>
<p><b>OEC b – HUMAN HEALTH AND HYGIENE</b></p>	<p><b>CO 1:</b> To aware the students about personal and public health hygiene.</p> <p><b>CO 2:</b> Analyse the importance of medical care among students in the initial stage and its preventive measures.</p> <p><b>CO 3:</b> Explain the importance of medical care among students.</p> <p><b>CO 4:</b> The students may take care of the society and their family or surrounding against disease causing agents.</p> <p><b>CO 5:</b> Drug design may be attempted by the students in future.</p>



**CC- X: RESEARCH  
METHODOLOGY AND  
BIOTECHNIQUES**

**CO 1:** Relate to the learning process of how to write thesis and how to publish papers in various journals and to produce transform ants by employing the various transfer techniques in the applied research.

**CO 2:** Experiments with the concept of permanent mounting and its application.

**CO 3:** Critically evaluate cell culture techniques in various experiments.

**CO 4:** Explain the scope of Biostatistics

**CO 5:** Test the hypotheses using chi-square test, compare the data using 't' test, analyze the data using ANOVA, explain types of Correlation and regression and to analyze and apply various statistical tools.

**CC-XI: EVOLUTION**

- CO 1:** Describe the basic methods that are used to reconstruct the evolutionary histories of, and relationships among, groups of organisms.
- CO 2:** Based on evolutionary theory, predict how differences in population size, natural selection and gene flow will affect genetic variation and future adaptability of populations.
- CO 3:** Apply knowledge of evolution to the solution of problems facing the human population and to the preservation of biodiversity.
- CO 4:** Exemplify problems in human society that are caused by a misunderstanding of the scientific process generally, and of evolution specifically

**CC-XII: ENTOMOLOGY**

- CO 1:** Explain the morphology of insects and analyze the appendages and their function.
- CO 2:** Relates the structure and function of organ systems, describe classification, biology and control of insect vector and control.
- CO 3:** Explain insect metamorphosis and analyze role hormones in metamorphosis and to analyze genetic material in insects.
- CO 4:** Explain the recombinant technology in insects and to describe molecular basis of insect behavior. List the types of pesticides, modes of actions, and efficacy. Identify the insect pests of crops, vegetables, fruits, stored grains and household pests.

**CC-XIII:  
BIOTECHNOLOGY**

**CO 5:** Enhance the productivity of agricultural crops through insect pest management and to analyze and apply the biological control of insect pests. Explain the IPM

**CO 1:** Explain a thorough knowledge of the genome and provide basic practices for modifying organisms to produce desired products. Experiments with concepts of selection and screening of recombinants.

**CO 2:** Outline the methodology and the wide applications of biotechnology for the production of various industrial products. Appraise the environmental applications of biotechnology to clear the pollutants and production of bioenergy using microbe.

**CO 3:** Explains the large scale cell culture and somatic cell fusion. Whole organ culture. Transgenic animal – goat. Importance of sterile fish, monosex culture of male, female by steroid hormones, hybridization and genetic selection.

**CO 4:** Target tissue of choice for gene delivery system and application of nanotechnology in drug delivery. Concepts of pharmacogenomics and personalized medicine and their advantages. States the approaches used for molecular markers. Methods involved and the application in forensic medicine.

	<p><b>CO 5:</b> Advantages of biotechnology in enzyme production using microbes.</p> <p><b>CO 6:</b> Aspects of biotechnology in the production of SCP, nitrogen fixing, Bio-pesticides and Biofertilizers to improve the agriculture.</p>
<p><b>CC – XIV: PRACTICAL - III (COVERING CC-X to CC-XIII)</b></p>	<p><b>CO 1:</b> Knowledge among students to give an idea about various biotechniques to be applied for their research work in future.</p> <p><b>CO 2:</b> Justify various tests to detect the disorders of our body.</p> <p><b>CO 3:</b> Describe the role of pH in our body and its impact related to body.</p> <p><b>CO 4:</b> Relates the importance of insect pest in various fields and its impact may be analysed.</p> <p><b>CO 5:</b> Assess the various research techniques to solve the problems in near future.</p>

**EC- II a: CLINICAL  
ANALYSIS AND  
LABORATORY  
TECHNIQUES**

- CO 1:** Explain the principle, types and biological application of various instruments.
- CO 2:** Knowledge and skill in the study and analysis of various biological samples.
- CO 3:** To get employment opportunities in various government and nongovernmental organizations in the field of clinical laboratory.
- CO 4:** The learned techniques may be applied to the villagers against various disease awareness (lab to land techniques).
- CO 5:** Laboratory accidents may be prevented to learn this course.

**EC -II b:  
AQUACULTURE**

- CO 1:** Ability to setup the pond layout, construction and preparation, hatchery and nursery operations in local areas to full fill the employment needs.
- CO 2:** Describe the water quality management techniques.
- CO 3:** Explain how to set up various aquarium systems and to maintain them.
- CO 4:** Identify the pathogens, diseases and their treatment in fishes.
- CO 5:** Identify global cultural, social, economic and historical factors that affect various aquaculture in natural and artificial forms.

**EC- III a: ECOLOGY  
AND ECOTOXICOLOGY**

- CO 1:** To know about environment and its role in various aspects.
- CO 2:** Explain in detail the importance and conservation of natural resources.
- CO 3:** Write the causes and effects of pollution and their control measures.
- CO 4:** Discuss the role of individual in conservation of environment.
- CO 5:** To know various toxicants which affect the environment and its remedial process make the students to create employment opportunities.

**EC- III b:  
NANOBIOTECHNOLOGY**

- CO 1:** Discuss the most significant discoveries and their impacts on the development of Nano biotechnology .
- CO 2:** Explain the fundamental structure, properties and processes in which the Nano particles play a part in different fields.
- CO 3:** This field would help the students for drug discovery along with several plant extracts.
- CO 4:** Independently execute a laboratory experiment using the standard methods and techniques in Nano biotechnology, with the appropriate analysis and interpretation of results obtained.
- CO 5:** Process the results obtained in the conducted experiments using computer processing, and display the results in the form of a written report.

**EC- IV a: CANCER AND  
STEM CELL BIOLOGY**

- CO 1:** This course work provides chance to work in stem cells and cancer stem cells.
- CO 2:** There is a chance for the students to enter into the modern cancer and stem cell laboratories as scientist

**EC-IV b:  
ENDOCRINOLOGY**

- CO 1:** Able to describe the organisation and structure of the endocrine systems and their relation to other organ systems.
- CO 2:** Able to explain the endocrine systems general regulation at normal function and at deranged homeostasis.
- CO 3:** Able to explain for how various types of hormones seems and the principles behind the function of hormone receptors.
- CO 4:** Able to describe at a general level pharmacological treatment that includes the endocrine organs.
- CO 5:** Able to explain the blood glucose raising and- reducing metabolic processes  
search after information in scientific databases.