

Goswami Tulsidas Govt. P.G. College, Karwi, Chitrakoot



SUBJECT: ZOOLOGY

B.Sc. Zoology

Programme Outcomes:

- (1) The programme has been designed in such a way so that the students get the flavor of both classical and modern aspects of Zoology/Animal Sciences. It aims to enable the students to study animal diversity in Indian subcontinent, environmental science and behavioral ecology.
- (2) The modern areas including cell biology and genetics, molecular biology, biochemistry, physiology followed by biostatistics, Evolutionary biology, bioinformatics and genetic engineering have been included to make the study of animals more interesting and relevant to human studies which is the requirement in recent times.
- (3) The lab courses have been designed in such a way that students will be trained to join public or private labs.

Programme Specific Outcomes (PSOs):

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First Year	Certificate Course in Medical Diagnostics & Public Health <ul style="list-style-type: none">➤ This course introduces System Biology and various functional components of an organism. Emphasis will be on physiological understanding abnormalities and anomalies associated with white blood cells and red blood cells. The course emphasizes cell identification, cell differentiation and cell morphology evaluation procedures. This will enhance hematology analytical skills along with skill of using many instruments.➤ The students will learn the basic principles of genetics and how to prepare karyotypes to study the chromosomes.➤ How chromosomal aberrations are inherited in humans by pedigree analysis in families.➤ The students will have hands-on training in the techniques like microscopy, centrifugation and chromatography, and various biochemical techniques, preparation of slides which will help them in getting employment in pathology labs and contribute to health care system➤ The Certificate courses will enable students to apply for technical positions in government and private labs/institutes

<p>Second Year</p>	<p style="text-align: center;">Diploma in Molecular Diagnostics and Genetic Counseling</p> <ul style="list-style-type: none"> ➤ The student at the completion of the course will be able to have a detailed and conceptual understanding of molecular processes viz. DNA to trait. The differential regulation of genes in prokaryotes and eukaryotes leads to the development of an organism from an embryo. ➤ The students will be able to understand and apply the principles and techniques of molecular biology which prepares students for further career in molecular biology. Independently execute a laboratory experiment using the standard methods and techniques. ➤ The principles of genetic engineering, gene cloning, immunology and related technologies will enable students to play an important role in applications of biotechnology in various fields like agriculture, forensic sciences, industry and human health and make a career out of it. Students can have their own start-ups as well. ➤ The basic tools of bioinformatics will enable students to analyze large amount of genomic data and its application to evolutionary biology. Apply knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics existing software effectively to extract information from large databases and to use this information in computer modeling. ➤ The Diploma courses will ensure employability in Hospitals/Diagnostics and Pathology labs with good hands-on training. It will also enable students to take up higher studies and Research as their career and work in renowned labs in the country and abroad.
<p>Third Year</p>	<p style="text-align: center;">Degree in Bachelor of Science</p> <ul style="list-style-type: none"> ➤ This programme aims to introduce students to animal diversity of invertebrates and vertebrates. The students will be taught about invertebrates and vertebrates using observational strategies, museum specimens and field reports ➤ A variety of interacting processes generate an organism's heterogeneous shapes, size, and structural features. ➤ Inclusion of ecology and environmental sciences will enrich students with our world which is crucial for human well being and prosperity. This section will provide new knowledge of the interdependence between people and nature that is vital for food production, maintaining clean air and water, and sustaining biodiversity in a changing climate. ➤ Students will also come to know about the basic principle of life, how a cell divides leading to the growth of an organism and also reproduces to form new organisms. ➤ The basic concepts of biosystematics, evolutionary biology and biodiversity will enable students to solve the biological problems related to environment. ➤ At the end of the course the students will be capable enough to comprehend the reason behind such a huge diversity of animals and reason out why two animals are grouped together or remain separate due to similarities and differences which exist at many levels along with ecological, environmental and cellular inputs. ➤ The Degree courses will enable students to go for higher studies like Masters and Ph.D in Zoology and Allied subjects.

Course outcomes:

B.Sc. 1st Semester (Zoology)

Course Title: Cytology, Genetics and Infectious Diseases:

Course outcomes: The student at the completion of the course will be able to:

- Understand the structure and function of all the cell organelles.
- Know about the chromatin structure and its location.
- To be familiar with the basic principle of life, how a cell divides leading to the growth of an organism and also reproduces to form new organisms.
- How one cell communicates with its neighboring cells?
- Understand the basic principles of genetics and how genes (earlier called factors) are inherited from one generation to another.
- Understand the Mendel's laws and the deviations from conventional patterns of inheritance.
- Comprehend how environment plays an important role by interacting with genetic factors.
- How to detect chromosomal aberrations in humans and study the pattern of inheritance by pedigree analysis in families.

Course Title: Cell Biology & Cytogenetics Lab:

Course outcomes: At the completion of the course students will learn Hands-on:

- To use simple and compound microscopes.
- To prepare slides and stain them to see the cell organelles.
- To be familiar with the basic principle of life, how a cell divides leading to the growth of an organism and also reproduces to form new organisms.
- The chromosomal aberrations by preparing karyotypes.
- How chromosomal aberrations are inherited in humans by pedigree analysis in families.
- 6. The antigen-antibody reaction.

B.Sc. 2nd Semester (Zoology)

Course Title: Biochemistry and Physiology:

Course outcomes: The student at the completion of the course will learn:

- To develop a deep understanding of structure of biomolecules like proteins, lipids and carbohydrates
- How simple molecules together form complex macromolecules.
- To understand the thermodynamics of enzyme catalyzed reactions.

- Mechanisms of energy production at cellular and molecular levels.
- To understand systems biology and various functional components of an organism.
- To explore the complex network of these functional components.
- To comprehend the regulatory mechanisms for maintenance of function in the body.

Course Title: Physiological, Biochemical & Hematology Lab:

Course outcomes: The student at the completion of the course will be able to:

- Understand the structure of biomolecules like proteins, lipids and carbohydrates
- Perform basic hematological laboratory testing,
- Distinguish normal and abnormal hematological laboratory findings to predict the diagnosis of hematological disorders and diseases.

B.Sc. 3rd Semester (Zoology)

Course Title: Molecular Biology, Bioinstrumentation & Biotechniques:

Course outcomes: The student at the completion of the course will be able to have:

- A detailed and conceptual understanding of molecular processes viz. DNA to trait.
- A clear understanding of the processes of central dogma viz. transcription, translation etc. underlying survival and propagation of life at molecular level.
- Understanding of how genes are ultimately expressed as proteins which are responsible for the structure and function of all organisms.
- Learn how four sequences (3 letter codons) generate the transcripts of life and determine the phenotypes of organisms.
- How genes are regulated differently at different time and place in prokaryotes and eukaryotes.

Course Title: Bioinstrumentation & Molecular Biology Lab:

Course outcomes: The student at the completion of the course will be able to

- Understand the basic principles of microscopy, working of different types of microscopes
- Understand the basic techniques of centrifugation and chromatography for studying cells and separation of biomolecules
- Understand the principle of measuring the concentrations of macromolecules in solutions by colorimeter and spectrophotometer and use them in Biochemistry.
- Learn about some of the commonly used advance DNA testing methods

B.Sc. 4th Semester (Zoology)

Course Title: Gene Technology, Immunology and Computational Biology:

Course outcomes: The student at the completion of the course will be able to:

- Understand the principles of genetic engineering, how genes can be cloned in bacteria and the various technologies involved in it.
- Know the applications of biotechnology in various fields like agriculture, industry and human health.
- To have an in depth understanding about Immune System & its mechanisms.
- Get introduced to DNA testing and utility of genetic engineering in forensic sciences.
- Get introduced to computers and use of bioinformatics tools.
- Enable students to get employment in pathology/Hospital.
- Take up research in biological sciences.

Course Title: Genetic Engineering and Counselling Lab:

Course outcomes: The student at the completion of the course will be able to:

- Understand the principles of genetic engineering with hands-on experiments in mutation detection, testing of infectious diseases like Covid 19.
- Get introduced to DNA testing and utility of genetic engineering in forensic sciences.
- Apply knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics existing software effectively to extract information from large databases and to use this information in computer modeling.
- Use bioinformatics tools to find out evolutionary/phylogenetic relationship of organisms using gene sequences.
- Get employment in Hospitals/Diagnostic and forensic labs/Counsel families with genetic disorders.
- Enable students to take up research in biological sciences.

B.Sc. 5th Semester (Zoology)

Course Title: Diversity of Non-Chordates and Economic Zoology:

Course outcomes: The student at the completion of the course will be able to: The student at the completion of the course will be able to:

- demonstrate comprehensive identification abilities of non-chordate diversity
- explain structural and functional diversity of non-chordate
- explain evolutionary relationship amongst non-chordate groups
- Get employment in different applied sectors
- Students can start their own business i.e. self employments.
- Enable students to take up research in Biological Science

Course Title: Diversity of Chordates and Comparative Anatomy:

Course outcomes: The student at the completion of the course will be able to:

- Demonstrate comprehensive identification abilities of chordate diversity
- Explain structural and functional diversity of chordates

- Explain evolutionary relationship amongst chordates
- Take up research in biological sciences.

Course Title: Lab on Virtual Dissection, Anatomy, Economic Zoology and Parasitology:

Course outcomes: The student at the completion of the course will be able to:

- demonstrate comprehensive identification abilities of chordate and non- chordates diversity
- explain structural and functional diversity of chordates and non- chordates
- explain evolutionary relationship amongst chordates and non- chordates
- Generate self employment
- Enable students to take up research in biological sciences

B.Sc. 6th Semester (Zoology)

Course Title: Evolutionary and Developmental Biology:

Course outcomes: The student at the completion of the course will be able to:

- Understand that by biological evolution we mean that many of the organisms that inhabit the earth today are different from those that inhabited it in the past.
- Understand that natural selection is one of several processes that can bring about evolution, although it can also promote stability rather than change.
- Understand how the single cell formed at fertilisation forms an embryo and then a full adult organism.
- Integrate genetics, molecular biology, biochemistry, cell biology, anatomy and physiology during embryonic development.
- Understand a variety of interacting processes, which generate an organism's heterogeneous shapes, size, and structural features.
- Understand how a cell behaves in response to an autonomous determinant or an external signal, and the scientific reasoning exhibited in experimental life science

Course Title: Ecology, Ethology, Environmental Science and Wildlife:

Course outcomes: The student at the completion of the course will learn:

- Complexities and interconnectedness of various environmental levels and their functioning.
- Global environmental issues, their causes, consequences and amelioration.
- To understand and identify behaviours in a variety of taxa.
- The proximate and ultimate causes of various behaviours.
- About the molecules, cells, and systems of biological timing systems.
- Conceptualizing how species profitably inhabit in the temporal environment and space out their activities at different times of the day and seasons.

- To interpret the cause and effect of lifestyle disorders contributing to public understanding of biological timing.
- To understand the importance of wildlife conservation.

Course Title: Lab on Ecology, Environmental Science, Behavioral Ecology & wildlife:

Course outcomes: The student at the completion of the course will be able to:

- To understand the basic concepts, importance, status and interaction between organisms and environment.
- Get employment in forest services, sanctuaries, conservatories etc.
- Enable students to take up research in wildlife

B. Sc. 3rd Year (Zoology)

Paper I (APPLIED ZOOLOGY):

Students will get acquainted with the theoretical concepts of principles of aquaculture, sericulture, apiculture, lac culture, pisciculture and aquarium fish keeping, poultry keeping, and Toxicology.

Paper II (ECOLOGY AND ENVIRONMENT):

Student will aware about the ecosystem and environment. In which they get knowledge of Natural resources, ecology, climate, pollution, disaster management etc.

Paper III (EVOLUTION AND MICROBIOLOGY):

Students are made aware about evolution of man and about microorganisms of the soil.