

BSc Biotechnology, Zoology

Programme Outcomes (PO)

1. Understand the nature and basic concepts of cell biology, genetics, genetic engineering, transgenics, applied zoology, physiology, ecology, and biochemistry
2. To provide students with the concepts and research approaches for their higher career in the field of zoology and biotechnology and develop their scientific interests.
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4. To impart in-depth practical oriented knowledge to students in various thrust areas physiology, genetics, cell biology, genetic engineering, bioinstrumentation, and biostatistics so as to meet the demands of industry and academia.
5. Students can acquire skills to use modern analytical tools and advanced mechanisms to analyse and solve problems in various areas of life by employing biotechnology.
6. Program helps to understand the fundamental concepts in core (plant, animal, industrial biotechnology, molecular biology, genetic engineering and genetics) and allied (microbiology, immunology and physiology) branches of life sciences, with biotechnological techniques.
7. This program explores biochemical and molecular basis in living cells and employs the technical tools to study the ways they interact and communicate, which helps them to manipulate the living systems for the betterment of mankind.
8. The critical awareness in advances at the forefront of chemical and biological sciences prepare students effectively for professional employment or research in various fields where the thrust area will be the use of core and interdisciplinary subjects.
9. The programme offers employment opportunities as scientists, technical officers, biomedical engineer, biochemist, wildlife managers, zoo keepers, academic positions, taxonomists, curators, government bodies, entrepreneurs and researchers. The programme helps students to pass competitive exams like GATE, CSIR-NET, IIT JAM, DBT exams

Semester 1 – Course Title: **1BTDSC1-CBG: Cell Biology and Genetics**

Course Outcomes (CO)

1. The student will understand the concept of structure and function of a cell, role of cellular organelles and their cellular activities.
2. A deep understanding of eukaryotic chromosome structure and organization and their involvement in cell division will be provided.
3. Clear knowledge of cell cycle and identification of checkpoints involved.
4. Knowledge about how genetic information are transferred by a range of mechanisms for generating genetic diversity.
5. Will be able to explain the relation between chromosomal inheritance and disorders and the causes for such abnormalities.

Semester 1 Course Title: **1ZOODSC1-CGID: Cytology, Genetics, and Infectious Diseases**

Course Outcomes (CO)

1. The structure and function of the cell organelles.
2. The chromatin structure and its location.
3. The basic principle of life, how a cell divides leading to the growth of an
4. Organism and reproduces to form a new organism.
5. How a cell communicates with its neighbouring cells.
6. The principles of inheritance, Mendel's laws and the deviations.
7. How environment plays an important role by interacting with genetic factors.
8. Detect chromosomal aberrations in humans and study of pedigree analysis.

Semester 2 Course Title: 2BTDSC2-MML: Microbiological Methods

Course Outcomes (CO)

1. Students will be able to understand the theory behind various techniques and apply their knowledge better in the laboratory.
2. They will understand the importance of sterilization and the application of sterilants/disinfectants in medical and industrial domains.
3. Students will learn the different types of media that are used to grow different types of bacteria and also learn to preserve cultures for long-term use. Staining techniques will help them understand the importance of characterizing bacteria based on their cell wall components.
4. Students will appreciate the different shapes of bacteria and their arrangement and also understand the pattern in which bacteria grows.
5. They will understand the mode of action of various drugs and how exactly diagnostic laboratories process samples.
6. They will comprehend how genes get passed on from one microbial organism to the other horizontally.
7. They will understand the basis on which viruses are classified and the life cycle they follow.

Semester 2 Course Title: 2ZOODSC2-BP: Biochemistry and Physiology

Course Outcomes (CO)

1. To develop a deep understanding of structure of biomolecules like proteins, lipids, and carbohydrates.
2. How simple molecules together form complex macromolecules.
3. To understand the thermodynamics of enzyme catalysed reactions.
4. Mechanisms of energy production at cellular and molecular levels.
5. To understand various functional components of an organism.
6. To explore the complex network of these functional components.
7. To comprehend the regulatory mechanisms for maintenance of function in the body.

Semester 3 Course Title: **3BTDSC3-B: Biomolecules**

Course Outcomes (CO)

1. Students will be provided with the fundamental knowledge about bioenergetics of biochemical processes.
2. Understand in detail the structure and physico-chemical properties of carbohydrates ranging from monosaccharide to polysaccharides. Also the building blocks of proteins and to understand how they interact to form proteins along with types of lipids and their role in biological systems.
3. They will get a deeper insight into the fundamentals of enzyme structure and function and kinetics.
4. To recognize and understand each of the vitamins, hormones and nucleic acids and their significance.
5. Exhibit a knowledge base of the different instruments that are commonly used in the field of biochemistry and to understand their practical applications.

Semester 3 Course Title: **3ZOODSC3-MBBTB: Molecular Biology Bioinstrumentation & Techniques in Biology**

Course Outcomes (CO)

1. After successful accomplishment of the course, the learners will be able to acquire better understanding and comprehensive knowledge regarding most of the essential aspects of molecular biology subject which in turn will provide a fantastic opportunity to develop professional skill related to the field of molecular biology.
2. The course will mainly focus on the study of principal molecular events of cell incorporating DNA replication, transcription and translation in prokaryotic as well as eukaryotic organisms.
3. Acquiring knowledge on instrumentation and techniques in biology.

Semester 4 Course Title: **4BTDSC4-MOB: Molecular Biology**

Course Outcomes (CO)

1. Students are exposed to the history of molecular biology through several experiments that made a breakthrough in science.
2. They will understand how DNA replicates and the differences between prokaryotic and eukaryotic DNA replication.
3. They will understand the fundamental concept of transcription and how genes are coded both in prokaryotes and eukaryotes.
4. They will understand the link between replication, transcription and translation and will also be able to comprehend the various modifications brought out in the protein once produced.

Semester 4 Course Title: **4ZOODSC4-GTICB: Gene Technology, Immunology and Computational Biology**

Course Outcomes (CO)

1. Acquaint knowledge on versatile tools and techniques employed in genetic engineering and recombinant DNA technology.
2. An understanding on application of genetic engineering techniques in basic and applied experimental biology.
3. To acquire a fundamental working knowledge of the basic principles of immunology.
4. To understand how these principles, apply to the process of immune function.
5. Use, and interpret results of, the principal methods of statistical inference and design; helps to communicate the results of statistical analyses accurately and effectively; helps in usage of appropriate tool of statistical software.

Semester 5 paper 5 Course Title: **5BTDS5 – GE: Genetic Engineering**
Course Outcomes (CO)

1. Students will be introduced to the concepts of genetic engineering.
2. The different tools that are used in genetic engineering experiments will be taught in detail to the students.
3. The various vectors used in genetic engineering techniques, the advantages and disadvantages of each vector their construct will be understood by the students.
4. Students will be introduced to the various methods used for gene cloning.
5. The various techniques involved in genetic engineering and their importance and relevance to the present times will be understood by the students.
6. Students will learn to apply their knowledge by studying various domain specific examples.

Semester 5 paper 6 Course Title: **5BTDS6 – PB: Plant Biotechnology**
Course Outcomes (CO)

1. Students are introduced to the various terminologies and concepts of Plant Tissue Culture.
2. The framework and design of a plant tissue culture lab is explained in detail that will help them apply their knowledge in the future if they become entrepreneurs.
3. The importance of sterilization is dealt with in great detail to prevent any contamination in the laboratory.
4. Students will get introduced to the different types of media and the ways to prepare them.
5. They will appreciate the various types of cultures obtained in a PTC laboratory.
6. Students will be able to comprehend how an explant is grown in the lab and acclimatized to the outside environment.
7. The importance of protoplast cultures will be appreciated by the students and the various techniques used for the same will be studied.
8. The numerous variations obtained while growing cultures in the lab will be studied in detail.
9. Students will learn the applications of cell suspension cultures
10. Applications of plant biotechnology with respect to the different crops will be learnt in much detail.

Semester 5 paper 5 Course Title: **5ZOODSC5 – DNCEZ: Diversity of Non – Chordates and Economic Zoology**

Course Outcomes (CO)

1. Demonstrate the comprehensive identification abilities of non-chordates.
2. Understand and explain evolutionary relationship amongst non-chordate groups.
3. Encourage and equip them for entrepreneurship.
4. Enable students to take up research in Biological Science.

Semester 5 paper 6 Course Title: **5ZOODSC6 – DCCA: Diversity of Chordates and Comparative Anatomy**

Course Outcomes (CO)

1. Demonstrate comprehensive identification abilities for chordates diversity.
2. Understand the structural and functional diversity of chordates.
3. Develop the ability to work collaborative team-based projects.
4. Study the evolutionary relationship amongst chordate groups.
5. Enable students to take up research in biological Science.

Semester 6 paper 7 Course Title: **6BTDS7 – IMB: Immunology and Medical Biotechnology**

Course Outcomes (CO)

1. Helps to demonstrate the basic knowledge of immunological processes
2. Provide students with the basic knowledge about the functioning of the immune system, inflammation, immune response against infectious agents
3. Elucidate the genetic basis for immunological diversity and the generation of adaptive immune responses
4. Understand and explain the basis of immunological mechanisms involved in recognition and rejection of cells and tissues
5. Understand and explain the basis of immunological tolerance, autoimmunity and immunodeficiencies
6. Become aware of the potentials of stem cells and the associated ethical issues
7. Lets the students know about the benefits of the therapeutic products
8. Know the tools available for disease diagnosis
9. Get introduced to the use of nanotechnology in therapy

Semester 6 paper 8 Course Title: **6BTDS8 – BT: Bioprocess Technology**

Course Outcomes (CO)

1. Understand the basics of fermentation process and also able to describe the fermentor through analyzing the materials and methods for the working of a fermentor
2. Students gain knowledge in deep about process and product optimization, also be able to produce, analyse and interpret data from fermentation
3. Students are able to learn the steps and operations involved in microbial primary metabolites production
4. Students are familiarize with industrially relevant microbial strains and processes for production of enzyme, biopolymer and food products
5. Students are able to connect with secondary metabolites production, also the use of recombinant technology in pharmaceutically important microbial bioproducts production.

Semester 6 paper 7 Course Title: **6ZOODSC7 – EDB: Evolutionary and Developmental Biology**

Course Outcomes (CO)

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

Semester 6 paper 8 Course Title: **6ZOODSC8 – EBWMC: Environmental Biology, Wildlife Management & Conservation**

Course Outcomes (CO)

1. Develop an understanding of how animals interact with each other and their natural habitat.
2. Develop the ability to use the fundamental principles of wildlife ecology to solve local, regional and national conservation and management issues, also encourage wildlife tourism.
3. Develop the ability to work collaborative team-based projects.
4. Gain an appreciation for the modern scope of scientific inquiry in the field of wildlife conservation management.
5. Develop an ability to analyze, present and interpret wildlife conservation and management.

