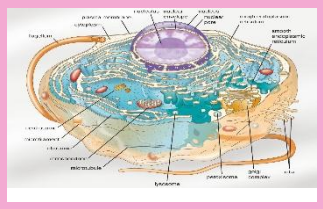
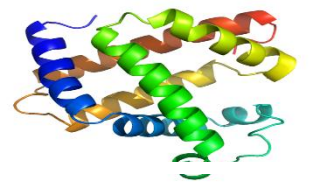


First Semester: Cell Biology and Genetics

At the end of the course, students will be able to:

- Understand concepts in Biotechnology and demonstrate knowledge acquired in interdisciplinary skills in cell biology and genetics
- Comprehend the structure of a cell with its organelles
- Understand the chromatin structure and its location
- Understand the basic principles of live and how a cell divide
- Explain the organization of genes and chromosomes, chromosome morphology and its aberrations

Second Semester: Microbiological Methods



Third Semester: Biomolecules

At the end of the course the student should be able to:

Acquire knowledge about types of biomolecules, structure and their functions

Will be able to demonstrate the skills to perform bioanalytical techniques

Apply comprehensive innovations and skills of biomolecules to Biotechnology field

Fourth Semester: Molecular Biology

At the end of the course the student should be able to:

Study the advancements in Molecular biology with latest trends

Will acquire the knowledge of structure, functional relationship of proteins and nucleic acids

Aware about the basic cellular processes such as transcription, translation, DNA replication and repair mechanisms

Fifth Semester - Paper V: Genetic Engineering

Demonstrate a thorough understanding of the fundamental principles and techniques of Genetic Engineering

Apply the knowledge of Genetic Engineering to diverse applications in agriculture, medicine, biotechnology and environmental science

Perform laboratory procedures and develop practical skills in genetic engineering techniques

Explain gene expression regulation mechanisms and apply genetic modification methods effectively

Evaluate genetic engineering's ethical, social and legal implications and propose responsible solutions

Stay updated with recent advancements in genetic engineering, critically evaluate emerging trends, and assess their potential impact on various fields

Fifth Semester - Paper VI: Plant and Animal Biotechnology

After completing the course, the student is expected to learn the following:

Demonstrate a comprehensive understanding of plant biology, physiology, genetics, and molecular biology

Apply biotechnological tools and techniques used in plant research and agriculture, such as plant tissue culture, genetic engineering and transgenics

Execute plant tissue culture techniques for callus induction, somatic embryogenesis, and micropropagation and apply them in plant breeding and propagation

Perform plant transformation methods and demonstrate the ability to introduce foreign genes into plants using different techniques

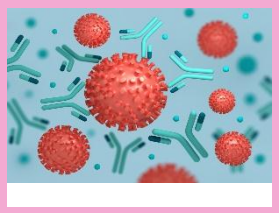
Apply knowledge about ethical considerations and regulatory frameworks associated with plant biotechnology and genetically modified crops

Understand the biology and characterization of cultured cells, including their adhesion, proliferation, differentiation, morphology and identification

Gain practical skills in basic mammalian cell culture techniques, measuring growth parameters, assessing cell viability and understanding cytotoxicity

Learn about germplasm conservation techniques and the establishment of gene banks along with large-scale culture methods for cell lines

Explore organ and histotypic culture techniques, biotransformation, 3D Cultures, whole embryo culture, somatic cell cloning, and the ethical considerations surrounding stem cells and their applications.



Sixth Semester – Paper VII: Immunology

At the end of the course, the student should be able to:

Demonstrate comprehension of the underlying structure and function of the immune system and related disorders

Demonstrate an understanding of the role of cells and molecules in immune reactions and responses

Demonstrate technical skills in immunological tools and techniques

Apply the domain-specific knowledge and skills acquired in immunology for innovative therapies and immune-technologies

Understand the fundamental concepts of immunity and the contributions of the organs and cells in immune responses

Realize how the MHC molecule's function and host encounters an immune insult

Understand the antibodies and complement system

Understand the mechanisms involved in the initiation of specific immune responses.

Differentiate the humoral and cell-mediated immune mechanisms

Comprehend the overreaction by our immune system leading to hypersensitive conditions and its consequences

Understand unique properties of cancer cells, immune recognition of tumours, immune evasion of cancers

Sixth Semester – Paper VIII: Bioprocess and Environmental Biotechnology

Exploration of microorganisms for industrial use and their improvement, and formulation of media for efficient growth and production of microbial or cell-based products

The design, operation and specific applications of various bioreactors

Demonstrate a comprehensive understanding of the fundamental concepts and principles of environmental biotechnology

Apply knowledge of biotechnological techniques to address environmental challenges such as pollution control and waste management

Analyse and evaluate environmental biotechnology case studies, research findings and andrel-world applications

Design and implement biotechnological approaches for environmental remediation, utilizing microbial processes and biodegradation principles

Evaluate the ethical and sustainable aspects of environmental biotechnology practices and make informed decisions regarding their application in environmental conservation

Communicate scientific concepts and research findings related to environmental biotechnology effectively, both in written and oral forms to diverse audiences.