



Department of Studies in Biotechnology

Programme Outcomes (POs):

At the end of the programme students will be able to:

- PO1:** Understand the fundamental concepts in core (stem cell, plant, animal, molecular biology, genetic engineering, genetics, industrial and environmental biotechnology, nanoscience and technology) and allied (health science, medical microbiology, chemistry, developmental biology and evolutionary biology) subjects.
- PO2:** Apply the Biotechnological concepts for basic and applied research and performing bio-protocols expertly by employing their practical training.
- PO3:** Explore new areas of research in all the branches of Biotechnology in addition to inter-disciplinary fields such as Chemistry and Physics.
- PO4:** Create an awareness of the impact of Biotechnology on the environment, society, and development outside the scientific community.
- PO5:** Use modern techniques, advanced equipment's and Bio-software's.
- PO6:** Meet the needs of the thrust areas of future bioscience.
- PO7:** Develop research and industry-oriented skills and acquiring competence to work in industry and research labs.

Course Outcomes (COs):

I Semester

Title of the Course with Code: BT-HCT 1.1 Biomolecules and Metabolism

After completion of this course students will be able to

CO	Statement
CO1	Identify the characteristics of living organisms.
CO2	Understand the fundamental biochemical principles and the regulation of biological/biochemical processes.
CO3	Review the structure of biomolecules and cite the importance of these biomolecules in biological systems.
CO4	Predict potential outcomes of biochemical defects.

Title of the Course with Code: BT-HCT 1.2 Molecular biology

After completion of this course students will be able to

CO	Statement
CO1	Know about fundamentals of molecular concepts
CO2	Acquire the in-depth knowledge of biological and/or medicinal processes through the investigation of the underlying molecular mechanisms.

Title of the Course with Code: BT-HCT 1.3 General Microbiology

After completion of this course students will be able to

CO	Statement
CO1	Understand the systematic position and salient features of the various microbes.
CO2	Classify the microbes based on the structure and biochemical characterization.
CO3	Role of microorganisms in the diversity
CO4	Sterilization and disinfecting the working environment for microbial cultivation
CO5	Use different types of staining techniques to observe the microbes

Title of the Course with Code: BT-SCT 1.1 Biochemical analysis and Techniques

After completion of this course students will be able to

CO	Statement
CO1	Apprehend the functioning, maintenance and safety aspects of the basic apparatus used in a Biotechnology lab.
CO2	Assimilate the principles and applications of centrifuge, electrophoresis and chromatography in research and related experiments.
CO3	Employ the knowledge for the separation of proteins/peptides by selecting appropriate separation techniques.

Title of the Course with Code: BT-SCT 1.2 IPR and Biosafety

After completion of this course students will be able to

CO	Statement
CO1	File national and international patent for the biotechnological inventions.
CO2	Gain knowledge about the biotechnological inventions between different countries
CO3	Predict the risk arise due to the use of Genetically Modified Organisms

Title of the Course with Code: BT-HCP 1.1 Biomolecules and Metabolism practical

After completion of this course students will be able to

CO	Statement
CO1	Analyze and identify the protein and carbohydrate concentrations by using qualitative and quantitative methods
CO2	Separate the DNA using agarose gel electrophoresis
CO3	Separate the protein using PAGE

Title of the Course with Code: BT-HCP 1.2 Molecular Biology practical

After completion of this course students will be able to

CO	Statement
CO1	Isolate the Genomic and Plasmid DNA from different biological samples
CO2	Analyze the properties of nucleic acids.
CO3	Quantify the nucleic acid using spectrometer
CO4	Execute the laboratory molecular techniques & to interpret laboratory experiments in molecular biology, with the appropriate analysis and interpretation of results obtained

Title of the Course with Code: BT-HCP 1.3 General Microbiology practical

After completion of this course students will be able to

CO	Statement
CO1	Implement microbial techniques for isolation of pure cultures of bacteria, fungi and actinomycetes
CO2	Demonstrate various staining techniques in identifications of microbes
CO3	Design culture media for microbe cultivation and isolation from various samples
CO4	Apply the sterilization and disinfection technical skills in Quality Control Department of pharma industries

II Semester

Title of the Course with Code: BT-HCT 2.1 Immunology

After completion of this course students will be able to

CO	Statement
CO1	Differentiate between different types of immune cells and acquire knowledge on cells involved in cell- mediated and humoral immunity
CO2	Understand the working principles of immune-diagnostic methods
CO3	Apply an imminent knowledge on immune system and immune power
CO4	Implement advance techniques in treating various infections and physiological problems

Title of the Course with Code: BT-HCT 2.2 Genetic Engineering

After completion of this course students will be able to

CO	Statement
CO1	Acquire the knowledge of the principles and methods of DNA manipulation and transfer into target cells.
CO2	Implement advanced technologies and protocols for DNA manipulation, genome editing and sequencing.
CO3	Provide knowledge about the RFLP & RAPD technique
CO4	Amplify the Various DNA samples through PCR

Title of the Course with Code: BT-HCT 2.3 Cell Biology

After completion of this course students will be able to

CO	Statement
CO1	Understand the evolutionary development of the cell
CO2	Compare the organization of prokaryotic and eukaryotic cellular organelles.
CO3	Understand the basic concepts about different cell organelles and its function.
CO4	Acquire knowledge on identifying cancer cells from normal cells.

Title of the Course with Code: BT-SCT 2.1 Bioinformatics and Biostatistics

After completion of this course students will be able to

CO	Statement
CO1	Comprehend the basics of bioinformatics scope and applications.
CO2	Acquire the major steps in pairwise and multiple sequence alignment and executing alignment by dynamic programming.
CO3	Interpret data and the outcomes of research findings.
CO4	Identify the methods and means of data collection and research methodology
CO5	Acquire knowledge of correlation and regression analysis and to interpret the outcomes of a research study.

Title of the Course with Code: BT-SCT 2.2 Food Biotechnology

After completion of this course students will be able to

CO	Statement
CO1	Analyze the nutrient content of food
CO2	Use microbial enzymes for food industry
CO3	Understand the enzymes action and main classes of enzymes used in food processing and organic properties of food
CO4	Describe selected classical fermentation processes and how fermentation can deliver nutrition
CO5	Acquires the unit operations in food processing and production of number of fermented products

Title of the Course with Code: BT-HCP 2.1 Immunology practical

After completion of this course students will be able to

CO	Statement
CO1	Understand the basics about the composition of human blood
CO2	Differentiate the structure of blood cells
CO3	Identify the concentration of antibodies

CO4	Interpret the laboratory tests in the diagnosis of infectious diseases.
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Title of the Course with Code: BT-HCP 2.2 Genetic Engineering practical

After completion of this course students will be able to

CO	Statement
CO1	Analyze various medical related real problems by applying the practical knowledge & gains hands on experience of handling various instruments.
CO2	Gain knowledge about the RFLP & RAPD technique. Amplify the Various DNA samples through PCR
CO3	Master various DNA isolation techniques.
CO4	Implement various techniques to handle different instrument.

Title of the Course with Code: BT-HCP 2.3 Cell Biology practical

After completion of this course students will be able to

CO	Statement
CO1	Relate cellular functions with the overall activity of a living organism.
CO2	Acquire knowledge about the structure and various stages of cells through mitosis.
CO3	Enlightens the cellular processes like cell signalling and metabolism.
CO4	Identify the chromosome

III Semester

Title of the Course with Code: BT-HCT 3.1 Animal Biotechnology

After completion of this course students will be able to

CO	Statement
CO1	Integrate various areas like medicine and agriculture, where this technology can be applied to gain opportunities
CO2	Gain knowledge on basics of cell culture techniques
CO3	Appreciate the difference between conventional products from recombinant products
CO4	Translate their theoretical knowledge to therapeutic output

Title of the Course with Code: BT-HCT 3.2 Plant Biotechnology

After completion of this course students will be able to

CO	Statement
CO1	Culture different plant parts
CO2	Understand the basic techniques in plant tissue culture and its applications
CO3	Relate various gene transfer techniques in plants.
CO4	Acquire knowledge on secondary metabolite production and genetic transformation in plants

Title of the Course with Code: BT-HCT 3.3 Enzyme technology

After completion of this course students will be able to

CO	Statement
CO1	Distinguish the fundamentals of enzyme properties, nomenclatures, characteristics and mechanisms
CO2	Compare methods for production, purification, characterization and immobilization of enzymes
CO3	Acquire knowledge on various application of enzymes that can benefit human life
CO4	Discover the current and future trends of applying enzyme technology for the commercialization purpose of biotechnological products.

Title of the Course with Code: BT-SCT 3.1 Environmental Biotechnology

After completion of this course students will be able to

CO	Statement
CO1	Inter-relate the concept of environment and biotechnological applications.
CO2	Predict challenging issues and offers solutions as introduction of biofertilizers and biopesticides.
CO3	Identify the role of biosensors in bioremediation.
CO4	Understand the concepts of toxicology.

Title of the Course with Code: BT-SCT 3.2 Techniques in Microbial Biotechnology

After completion of this course students will be able to

CO	Statement
CO1	Acquire technical knowledge and entrepreneurial skills in areas of microbial biotechnology

Title of the Course with Code: BT-HCP 3.1 Animal Biotechnology practical

After completion of this course students will be able to

CO	Statement
CO1	Utilize the animals for high value products production
CO2	Acquire knowledge in basic techniques of animal cell culture

Title of the Course with Code: BT-HCP 3.2 Plant Biotechnology practical

After completion of this course students will be able to

CO	Statement
CO1	Demonstrate the fundamental techniques in plant cell culture.
CO2	Acquire knowledge on techniques such as micropropagation, callus culture, somatic embryogenesis and synthetic seed technology

Title of the Course with Code: BT-HCP 3.3 Enzyme technology practical

After completion of this course students will be able to

CO	Statement
CO1	Able to quantitatively and qualitatively estimate protein and sugars can differentiate samples by doing different test.
CO2	Apply biochemical calculation for enzyme kinetics
CO3	Plot graphs based on kinetics data

IV Semester

Title of the Course with Code: BT-HCT 4.1 Bioprocess engineering

After completion of this course students will be able to

CO	Statement
CO1	Implement the genetic engineering course - to exploit microorganisms, to manipulate their metabolic pathways, and to improve the strain of industrially useful organisms
CO2	Analyze the pathways of secondary metabolite in microbes
CO3	Gain knowledge in the production of industrially important enzymes
CO4	Exploit microbial cellular processes for yield enhancement

Title of the Course with Code: BT-HCT 4.2 Medical Biotechnology and Nanobiotechnology

After completion of this course students will be able to

CO	Statement
CO1	Acquire knowledge of genetic counseling and pre –natal diagnosis is again an added advantage to the young generation
CO2	Diagnose various disease
CO3	Enhance the skill and knowledge in health care sector to improve employability
CO4	Acquire training skills in clinical research related to drug discovery
CO5	Acquire the knowledge in basics of nanobiotechnology and its application in medicine and biology
CO6	Deliver the drugs effectively using nano biotechnology
CO7	Apply the Nanobiotechnology in treatment of disease

Title of the Course with Code: BT-HCMP 4.3 Project dissertation

After completion of this course students will be able to

CO	Statement
CO1	To address and assess the diverse problems associated with various fields relevant to biotechnology through the techniques learnt to design managerial measures for a healthy environment.

Title of the Course with Code: BT-SCT 4.1 Research Methodology

After completion of this course students will be able to

CO	Statement
CO1	Design research plan
CO2	Use statistical method to find the significant of the results
CO3	Perform research experiments with proper controls

Title of the Course with Code: BT-SCT 4.2 Genomics and Proteomics

After completion of this course students will be able to

CO	Statement
CO1	Describe recent advances in genomics, transcriptomics, proteomics and metabolomics
CO2	Analyze information and data relating to specific genes using general and plant-specific databases, proteomics and metabolomics online portals, next generation sequencing tools and next generation mapping portals.

Title of the Course with Code: BT-HCP 4.1 Bioprocess engineering practical

After completion of this course students will be able to

CO	Statement
CO1	Identify new strains that can be used for commercial purposes and for industrial processes.
CO2	Exemplify the methods of identification of various strain for the production various pharma products

Title of the Course with Code: BT-HCP 4.2 Medical Biotechnology and Nanobiotechnology practical

After completion of this course students will be able to

CO	Statement
CO1	Acquire knowledge in identification of pathogenic microorganisms, their characterization, pathogenesis and control.
CO2	Safeguard rules for self & society and can work diagnostics and hospitals.
CO3	Synthesize and characterize various nanomaterials