

Name of the Department: Biotechnology

Programme: PG

| S.No | Course code | Course name | Course outcome |
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| SEMESTER I | | | |
| 1. | 15PBTC11 | Biochemistry | <ul style="list-style-type: none">• Developed sufficient background for those students who wish to study more advanced biochemistry.• Aware on thermodynamics and biological energy• Indepth knowledge in the classification, structure, function and metabolic pathways of carbohydrate, lipids and fatty acids• Understand the molecular structure and function of amino acids and proteins• Analyze the structure and function of DNA and biosynthesis of nucleotides• Basic knowledge on bioactive compounds and secondary metabolites• Familiar with various basic biochemistry techniques Ability of thinking in biochemistry fields |
| 2. | 15PBTC12 | Cell and Molecular Biology | <ul style="list-style-type: none">• Understand the basic structure and function of cell and cell organelles in prokaryotes and eukaryotes• Understand the history of genetic transformation principle of DNA• Analyse the Watson and Crick helical structure of DNA and to understand the different forms of DNA, mRNA, rRNA and tRNA• Explore the mechanisms of DNA replication, transcription and protein translation in both prokaryotes and eukaryotes• Role of physical, chemical and biological agents that causes mutation and DNA damage• Analyse the mechanisms of DNA repair |
| 3. | 15PBTC13 | Microbial Genetics | <ul style="list-style-type: none">• Understand the mechanism of regulation of gene expression• Basic concept of gene transfer methods- |

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| | | | <p>conjugation, transformation and transduction.</p> <ul style="list-style-type: none"> • In depth knowledge about the jumping genes and the process of transposition mechanism • Understand the genetics of viral phage, replication and integration in the host genome • Awareness on genetic organization of the chromosomes and its abnormalities • Basic concepts in genetics of drosophila, as a model organism <p>Understand what is gene linkage, crossing over and chromosomal mapping</p> |
| 4. | 15PBTC1P | Lab in Biochemistry | <ul style="list-style-type: none"> • Basic information on concepts of biochemistry including pH, buffer preparation and calculations • Hands on training to every students in the laboratory. • Knowledge on chromatographic techniques, enzyme assay, electrophoretic techniques. • Facts on screening and identification of industrially important enzymes • Extraction and purification of enzymes isolated from different sources • Understand the kinetics of enzyme production <p>Basic concepts of protein precipitation, purification and detection by SDS-PAGE</p> |
| 5. | 15PBTO11 | Bioinformatics | <ul style="list-style-type: none"> • Practical and the theoretical knowledge of DNA sequences, genomes, protein sequences and protein structure information that will prepare them for careers in bioinformatics, academia, industry and research. • Understand the vast quantities of data generated in the fields of molecular and biological sciences (databases available for different organisms). • Understand the basic algorithms of bioinformatics. • Fundamentals of sequence retrieval and alignment. |

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| | | | <ul style="list-style-type: none"> Analyse the phylogenetic relationship between the different organisms Basic applications of structural biology and molecular docking and knowledge on drug designing Acquiring problem-solving skills and gain experience in understanding, handling and developing important software used in pharmaceutical, chemical and biotechnology industries. |
| 6. | 15PBTO12 | Biophysics and Structural Biology | <ul style="list-style-type: none"> Differences between the four different protein levels. Understand the role of macromolecules in biological membranes. Ability to understand the theoretical aspects of biophysical techniques. Understand the role of structural biology in biology. Knowledge in the application of structural biology. |
| SEMESTER II | | | |
| 1. | 15PBTC21 | Microbiology | <ul style="list-style-type: none"> Enable students to understand the diversity of microbes and importance of classification of microorganisms Knowledge of different types of microorganisms that are invisible to our naked eyes. Understand the host-pathogen relationships Knowledge on infections caused by bacteria, virus and fungi Analyze the physiology of the bacteria and control mechanisms to prevent their growth Understand the students the influence of microorganisms and microbiological applications on everyday life. Role of microorganisms in composting, biogas production, sewage treatment and biodegradation |
| 2. | 15PBTC22 | Bioprocess Technology | <ul style="list-style-type: none"> Understand the scope and applications of |

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| | | | <p>industrial biotechnology.</p> <ul style="list-style-type: none"> • Methods of potential improvement of efficient strains to increase the yield of microbial products • Information of basic fermentors and its types. • Knowledge on immobilization of enzymes and cells and downstream processing of biologicals • Knowledge on the process of production of secondary metabolites. • Awareness on innovative fermented food products |
| 3. | 15PBTC23 | Recombinant DNA Technology | <ul style="list-style-type: none"> • Basic principles of recombinant DNA technology and its pros and cons • Knowledge on the bacterial vectors, viral vectors for the construction of recombinant molecule • Understand how to transform the recombinant molecule into the desire host • Acquire knowledge on methods of gene transfer into bacteria, plant, animal. • Gain knowledge on molecular techniques such as PCR, RFLP and RAPD. • Awareness on the important discovery of gene sequencing • Detect DNA, RNA, Protein by blotting techniques • Understand the application of rDNA in industrial enzyme production |
| 4. | 15PBTC2P | Lab in Microbial Genetics | <ul style="list-style-type: none"> • Enable the students to acquire the knowledge about basic technical skills in microbiology lab. • Enable the students in the culturing, storage and maintenance of microbes • Knowledge on biochemical identification of microbes • Knowledge on analysis of water quality and food samples • Methods of transformation of DNA by conjugation |

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| | | | <ul style="list-style-type: none"> • Isolation of bacteriophage from sewage samples • Knowledge on antibiotic susceptibility of bacteria • Hands on experience to every students. |
| 5. | 15PBTC2Q | Lab in Recombinant DNA Technology | <ul style="list-style-type: none"> • Hands on experience on molecular techniques to every students. • Perform DNA isolation from different organisms such as plant, bacteria and human blood. • Practical knowledge in transformation of recombinant DNA into bacteria • Amplify the gene of interest by polymerase chain reaction (PCR) • Perform cloning of the gene of interest in vector and screening of the recombinants and non recombinants • Identify the gene of interest by southern hybridization • Identify the protein of interest by western blotting |
| SEMESTER III | | | |
| 1. | 15PBTC31 | Animal Biotechnology | <ul style="list-style-type: none"> • Understand the basic principles of animal tissue culture. • Knowledge on the concept of transgenesis and methods of transferring genes using various vectors into the host • Understand fundamentals of animal genomics. • Understand the ethical issues related to animal biotechnology • Understand about the production of recombinant products. • Knowledge on biotechnological application for HIV diagnosis and gene therapy • Basic concepts and importance of intellectual property rights- patents, copyright, tradesecrets, trademark • Understand the principles of genetically modified organisms |

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| 2. | 15PBTC32 | Immunology & Immunotechnology | <ul style="list-style-type: none"> • Understand the cells and organs involved in the immune system of our body • Familiar with the body's natural defense (immunity), its mechanism and active immunity by vaccination • Understand the mechanisms of humoral and cell mediated immune response • Practical skills on different immunotechniques for disease diagnosis and identification • Basis of transplantation immunology and immunosuppressive agents • Understand how to combat the disease and immunotherapies available • Awareness on the current applications of immunological research in practice |
| 3. | 15PBTC3P | Lab In Immunology And Animal Tissue Culture | <ul style="list-style-type: none"> • Handling of animals, antigen preparation and bleeding techniques • Practical knowledge on antigen-antibody techniques • Identification of the blood groups using antibody specific to each blood group antigens and to study the principle of transfusion • Isolation and separate B and T lymphocytes from total human blood using nylon wool column • Skills on performing immunodiagnostic techniques of infectious diseases • Enumerate immune cells from human blood using haemocytometer • Detect the specific protein (antigen) present in the unknown protein sample using western blotting • Detect the presence or absence of antigen/antibody present in the unknown sample using ELISA • Isolate and purify the monoclonal antibody from polyclonal antibody using column • Knowledge on preparation of animal cell culture |

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| | | | media, culturing and maintenance of cell lines |
| 4. | 15PBT031 | Enzymes and Enzyme Technology | <ul style="list-style-type: none"> • Awareness on Enzyme Nomenclature and its types. • Understand the mechanism of enzyme inhibition. • Role of active site and its orientation effects. • Knowledge on commercial applications of enzymes. • Technique of immobilizing enzymes. |
| 5. | 15PBT032 | Molecular Oncology | <ul style="list-style-type: none"> • Understand the basic concepts and types of cancer • Understand the molecular biology of tumor invasion and metastasis • Ability in differentiating Oncogenes and Proto oncogenes. • Understand the molecular mechanisms of apoptosis and signaling pathways • Understand the classical and advance methods of diagnosis of cancer • Awareness on the current trends of cancer research and therapies available • Understand the cancer markers and its applications |
| 6. | 15PBTN31 | Concepts in Biotechnology | <ul style="list-style-type: none"> • Enable the students to understand about the basic concepts of modern biotechnology • Knowledge about the plant tissue culture, gene manipulation and genetic engineering • Knowledge on the methods of microbial screening • Production of microbial biomass such as spirulina, yeast, metabolites such as vitamins, amino acids, antibiotics • Understand the concept of transgenesis and artificial insemination • Awareness on the process of fermentation and fermentor. |
| SEMESTER IV | | | |

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| 1. | 15PBTC32 | Plant Biotechnology | <ul style="list-style-type: none"> • Knowledge of plant genome organization & organelles organization • Knowledge on the regulation of gene expression in plant development • Perception of Plant Tissue Culture and the techniques involved • Principle of plant genetic engineering and its application such as edible vaccines, plantibodies, resistance to bacterial, fungal and viral infections • Influence of plant hormones in plant tissue culture • Understand the molecular mechanism of agrobacterium mediated gene transfer • Basic knowledge on gene silencing using RNAi technology • Analyze the plant-pathogen interaction |
| 2. | 15PBTC32 | Lab in Plant Tissue Culture | <ul style="list-style-type: none"> • Basic knowledge of plant tissue culture such as surface sterilization, media preparation, contamination and other handling procedures • Understand techniques involved in plant tissue culture & to generate <i>in vitro</i> propagated plants • Knowledge on hardening techniques • Handling skills on agrobacterium mediated gene transfer • Isolation and purification of protoplasts • Hands on experience to all students • Importance on marketing of plants from plant tissue culture and horticulture |
| 3. | 15PBTO41 | Genomics & Proteomics | <ul style="list-style-type: none"> • Understand the theoretical knowledge of proteome, genomes. • Understand the various proteomic and genomic analysis techniques. • Understand the principle of DNA sequencing and mapping of the genome • Basic ideas about protein size, pI, identification and analysis by 2D techniques • Acquire problem-solving skills and gain |

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| | | | <p>experience used in biotechnology, pharmaceutical, chemical and industries.</p> <ul style="list-style-type: none"> • Applications of DNA array and protein array • Importance of pharmacogenomics in the identification of drug targets |
| 4. | 15PBTO42 | Environmental Biotechnology- | <ul style="list-style-type: none"> • Understand the basic concepts of environment and role of biotechnology in it. • Knowledge about the biological treatment of waste water. • Understand the role of bioremediation in environment • Ability to analyse the role of biotechnology in managing the hazardous compounds present in environment. |