

PROGRAMME SPECIFIED OUTCOMES**Sample PSOs of B.Sc. Biotechnology**

PSO1. Understand the principles and the applications of Biotechnology with an emphasis on the application of recombinant DNA technology to animals, plants and microbial organisms.

PSO2. To classify and explain the structure and general characteristics of microorganisms

PSO3. To explain the microbial degradation of pesticides, bioremediation and biofertilizers

PSO4. Understand the applications of biotechnology and advances in the different areas like medical, microbial, environmental, bioremediation, agricultural, plant, animal and forensic sciences.

PSO5. Students will possess hands-on technical skills necessary to support biotechnology research activity.

PSO6. Learn the concept and applications of monoclonal antibody technology.

PSO7. Have hands-on experience of basic techniques like agarose and polyacrylamide gel electrophoresis, various immunological techniques including ELISA, DOT-ELISA and UV-VIS Spectrophotometer.

PSO8. Explain the general principles of transgenic plants, animals and microbes.

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COURSE OUTCOMES (CO)- BSC BIOTECHNOLOGY

CO1. BIOCHEMISTRY-I

- Comprehended the energy source, chemical bonds and the principles of thermodynamic understood the importance of acid base balance
- Attained the knowledge of Biomolecules such as carbohydrates, protein and fat, their types and significance.
- Understood the knowledge of bile and cholesterol and its biological significance

CO2. INTRODUCTION TO BIOTECHNOLOGY

- Understand the principles and the applications of Biotechnology with an emphasis on the application of recombinant DNA technology to animals, plants and microbial organisms.
- To classify and explain the structure and general characteristics of microorganisms
- Understand the principles of bioremediation and biofertilizers
- Understand the applications of biotechnology and advances in the different areas like medical, microbial, environmental, bioremediation, agricultural, plant, animal and forensic sciences.

CO3. GENERAL MICROBIOLOGY

- Understand the history and scope of microbiology
- Study the branches of Microbiology Microscopy, Construction and working principles of different types of microscopes Compound, dark field, phase contrast , fluorescence and electron microscopes
- Understand sterilization and its principles
- Study staining techniques and different types of stains
- Microbial taxonomy
- General account of viruses and bacteria
- Study bacterial diseases of man-tetanus, tuberculosis, typhoid and cholera
- Study viral diseases –AIDS
- Microbial metabolism

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CO4. BIOCHEMISTRY-II

- Understand the metabolisms of macromolecule such as carbohydrates, protein and fat, their types and significance.
- Described the enzymes, mechanism of enzyme action and factors affecting the enzyme activity and its inhibitions.
- Understood the types and importance of vitamins and Hormones

CO5. LAB

- Laboratory safety and basic laboratory instrumentation
- To study the fundamental component and application of the Bio-safety cabinet (BSL) in biotechnology.
- To study the different parts and application of simple and compound microscope
- To study the fundamental of different sterilization method in laboratory practices (Autoclave, Radiation sterilization, laminar air flow, hot air oven)
- Estimation of Different macromolecules by visible spectrophotometer.
- To study the basic of standard curve preparations and application in biotechnology experiments.
- Qualitative analysis of macromolecules carbohydrates, protein and lipids.
- Basic methodology of chromatography

CO6. IMMUNOLOGY

- Understand basic immunology, immunity and its types
- Study cells and organs of immune system
- Learn about antigens and its types
- Study about antibody structure and its types and functions
- Study about complements, its pathways, properties and functions
- Learn different types of hypersensitivity
- Understand about Vaccines, types of vaccines
- Study about inactive, attenuated and recombinant vaccines-peptide and DNA vaccines

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CO7. MOLECULAR BIOLOGY

- Learn the structure of DNA and RNA
- Study the different enzymes used in replication
- Study the causes and mechanism if photo reactivation, excision repair, mismatch repair and SOS repair
- Structure of prokaryotic and eukaryotic genes
- Study about genetic code, properties of genetic code and wobble hypothesis
- Transcription in prokaryotes and eukaryotes
- Understand the concept of promoters, transcription factors.
- Learn post transcriptional modifications in eukaryotes
- Understand the mechanism of translation in prokaryotes and eukaryotes
- Study lac and trp operons

CO8. RECOMBINANT DNA TECHNOLOGY

- Learn about genetic engineering tools
- Study gene cloning vectors- plasmid, bacteriophages and cosmids
- Learn screening and selection of recombinant cells by immunological screening and colony hybridization
- Study genomic DNA libraries and C-DNA libraries
- Study expression of cloned DNA in E.coli
- Learn molecular biology techniques, Polymerase chain reaction, Site directed mutagenesis, Nucleic acid sequencing, Blotting techniques southern, western and northern blot
- Understand the application of r-DNA technology in human health

CO9. BIOINFORMATICS

- Understand the history and scope of bioinformatics.
- Meaning of sequence, sequence similarity, homology, meaning of alignment
- Substitution matrices (PAM and BLOSUM), Pairwise Alignment Concept of Global and Local Alignment, Dot matrix method, Dynamic programming (Needleman-Wunsch

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algorithm, Smith-Waterman algorithm, Choosing of best scoring matrix, gap penalties, Significance of score, EVD, FASTA and BLAST algorithms.

- Phylogenetic tree and terminology, different methods of Phylogenetic tree prediction.
- Different biological databases.

CO10. LAB

- Understanding the methodologies used for database searching, and determining the accuracies of database search.
- Understood the protein function from sequence through analysis of data..
- Skill development for the observation of blood cells and haemin crystals.
- Understood the working principle and applications of instruments.
- Principal and working of electrophoresis

CO11.ANIMAL BIOTECHNOLOGY

- Understand the history and scope of animal cell culture
- Comprehend basic concepts of establishing animal cell cultures
- Knowledge of different culture media used in animal cell culture
- Preparation of primary and secondary cell lines and its maintenance
- Understand the principles and applications of these technologies the different types of culture media and conditions for growth of animal cells
- Study the role of plasma clot, biological fluids and tissue extracts in media
- Learn about growth factors-EGF, PDGF, FGF, NGF, IL-1, IL-2 and epo
- Study primary and secondary cell cultures
- Study transfection in animal cells
- Understand selectable markers and transplantation of cultured cells.
- Study the expression of cloned proteins in animal cells
- Understand the downstream processing process of the expressed protein
- Understand the applications of animal tissue culture and production of vaccines in animal cells
- Learn hybridoma technology and monoclonal antibody production
- Learn the technique and application of production of transgenic mice

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- Understand the concept of gene therapy and embryo transfer technology

CO12. PLANT BIOTECHNOLOGY

- Understand the invitro methods in plant tissue culture
- Learn the aseptic techniques, the media used and the use of growth regulators
- Understand the technique of microporopagation
- Learn the in-vitro method of production of secondary metabolites
- Study about ovary, ovule, anther, embryo and endosperm cultures and their applications
- Learn organogenesis and somatic embryogenesis
- • Study somaclonal variations and their significance
- Learn about protoplast culture, its isolation, regeneration
- Learn viability tests of protoplasts
- Understand somatic hybridization and cybidization
- Learn about transgenic plants
- Understand agrobacterium mediated gene transfer in plants
- Understand microporoprojectile and electroporation techniques.
- Learn the applications of transgenic plants
- Study the role of plant tissue culture in agriculture, horticulture and forestry

CO13. MICROBIAL BIOTECHNOLOGY

- Learn the basic principles and fermentation technology
- Understand the screening and isolation of microorganisms
- Learn the maintenance of strains and improvement techniques
- Understand different types of fermenters-typical, airlift, tower and bubble up fermenter
Learn about solid state, submerged and continuous fermentation techniques.
- Learn downstream processing disintegration of cells, separation, extraction, concentration and purification of products
- Understand the production of microbial products obtained by microbial fermentation
- Production of alcohol, beer, citric acid, penicillin, glutamic acid and vitamin B12
- Understand enzyme biotechnology

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- Learn about industrially important enzymes used in detergents, leather, beverages, food and pharmaceuticals
- Learn the production of fermented foods-yoghurt, idli, cheese, tempeh.
- Learn about single cell proteins and single cell oils
- Learn plant cell suspension cultures for production of capsaicin and saffron
- Learn mass culture of spirulina
- Polysaccharides and polyesters
- Production of xanthan gum and PHA


CO14. LAB


- Preparation and sterilization of animal and plant tissue culture
- Handling and working of instruments like laminar air flow, autoclave, hot air oven etc.
- Culture of shoot tip, root tip, callus, organ, nodal and axillary buds.
- Protoplast and anther culture
- Somatic embryogenesis and preparation of synthetic seeds.
- Study growth curve of bacteria and yeast.
- Production of baker yeast, alcohol and wine.
- Production of primary and secondary metabolites.

CO15. PROJECT WORK (IN HOUSE)

- Understand the techniques and methodologies relevant to biotechnology (molecular biology and plant tissue culture) including research methodologies, data analysis and the use of statistics engagement with some of the current developments in the field of Biotechnology and their applications.


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