

## **B.Sc. (Hons) BIOTECHNOLOGY**

### **PROGRAM OUTCOMES**

- To make students familiar with various advancements in different fields of Biotechnology.
- The subject provides the students with an understanding of the manipulation of genes in order to produce genetically modified organisms with higher yields and better traits.
- Latest subjects like Bioinformatics provide students with an insight in to in-silico analysis along with wet lab experiments.
- Wide exposure is provided in syllabus so that all aspects of biotechnology are fully covered so that students get good exposure.
- Design, perform, and analyze results of experiments using basic molecular biology methodologies and recombinant DNA techniques, including agarose and polyacrylamide gel electrophoresis, restriction enzyme digestion, bacterial transformations, plasmid DNA protein expression, PCR, and tissue culture.
- Demonstrate proficiency in basic laboratory skills common to clinical→ and non-clinical research laboratories, including aseptic technique, making accurate and precise measurements using balances and macroand micro-pipetting, using a microscope, preparing solutions, operating current instrumentation, preparing samples for various analyses, and maintaining a proper scientific laboratory notebook. Exhibit growth in academic performance and personal and professional→ responsibility. Exhibit an ability to work independently and collaboratively→

## **PROGRAM SPECIFIC OUTCOMES**

- Students will be able to demonstrate and apply their knowledge of cell biology, biochemistry, microbiology and molecular biology to solve the problems related to the field of biotechnology.
- Student will be able to (a) Describe fundamental molecular principles of genetics; (b) Understand relationship between phenotype and genotype in human genetic traits; (c) Describe the basics of genetic mapping; (d) Understand how gene expression is regulated.
- The subject helps students to familiarize with basic laboratory instruments and understand the principle of measurements using those instruments with experiments in biochemistry.
- The subject provides an understanding of fundamental molecular principles of genetics; the relationship between phenotype and genotype in human genetic traits; the basics of genetic mapping and how gene expression is regulated.

## COURSE OUTCOMES

<b>First year Honours (Biotechnology)</b>			
<b>Title of Paper</b>	<b>Category</b>	<b>Paper Code</b>	<b>Subject Outcome</b>
1. Biochemistry & Metabolism	Core	BIOTECH1C01	Students will learn in detail different aspects of Biochemistry: carbohydrates, proteins, fats, enzymes, glycolysis, TCA cycle, Beta oxidation of fatty acids.
2. Genetics	Core	BIOTECH1C03	This course enlightens students about various laws of heredity, dominance, epistasis and also various sex linked inheritance, cytoplasmic inheritance, viral and bacterial structures, DNA packaging in eukaryotes, genome imprinting, Barr body, dosage compensation, Hardy- Weinberg lay and population genetics
3. Cell Biology	GE-1	MICRO1GE01	By understanding how cells work students get a detailed knowledge of the various mechanisms on which living beings work
4. Molecular Biology	Core	BIOTECH1C04	To make students familiar about structure, function of macromolecules viz. DNA, RNA, Proteins and their biosynthesis as well as regulation.
5. General Microbiology	Core	BIOTECH1C02	Students learn about microbes and general techniques of microbiology
<b>Second year Honours(Biotechnology)</b>			
3. Bioinformatics	Core	BIOTECH2SEC02	This course introduces students to basics of bioinformatics. Different databases, BLAST, FASTA,

			PAM & BLOSUM matrices
4. Enzymology	SEC	BIOTECH2SEC01	Insight in to details of enzyme kinetics, purification, immobilization
5. Recombinant DNA Technology	Core	BIOTECH2C07	The role and mechanism of various enzymes involved in the genetic engineering process such as restriction enzymes, polymerases, ligases etc. are explained into the students. Cloning vectors, PCR, various BLOTS, therapeutic proteins
6. Immunology	Core	BIOTECH2C05	The subject provides a detailed knowledge of our immune system and how it works to fight against various diseases.
7. Bioprocess Technology/ Biochemical Engineering	SEC	BIOTECH3DE01	Various methods of bioprocess technology and logistics of fermentation technology are taught.
8. Environmental Biotechnology	Core	BIOTECH2C08	In this course students learn about various biotechnological techniques used in environmental protection: bioremediation
9. Bacteriology and Virology	Core	BIOTECH2C09	Students are taught about various bacterial & viral diseases, structure of different viruses and bacteria.
10. Microbial Physiology	Core	BIOTECH2C10	
11. Bioanalytical Tools	GE-3	MICRO2GE02	The students are given an introduction into the concept of microscopy, spectroscopy, The principle and laws of fluorimetry and colorimetry applications of centrifugation in isolation of sub-cellular organelles and particles are

			also described.
<b>Third year Honours (Biotechnology)</b>			
13. Plant Biotechnology	Core	BIOTECH3C12	Various aspects related to plant tissue culture, media ,conditions involved are taught to students.
14. Animal Biotechnology	Core	BIOTECH3C11	Various aspects related to animal tissue culture, media ,conditions involved are taught
15. Ecology and Environment	SEC	BIOTECH3DSE03	Students learn about ecology and various types of ecosystem, polluting agents, bioremediation, various case studies
16. Food Biotechnology	Core	BIOTECH3C14	This course gives students detailed idea about aspects of food preservation, fermentation techniques, fermented foods and beverages, probiotics, spoilage microbes & diseases associated with them
17. Advances in Microbiology	SEC	BIOTECH3DSE02	In this course advanced microbial techniques are taught along with different genomes, metagenomics, type three secretion system, synthetic biology.
18. Medical Microbiology	Core	BIOTECH3C13	In this course various microbial diseases and their epidemiology is worked out.