

Course Outcomes of Biotechnology

Course: BSC		Outcomes
BIOTECHNOLOGY		
Course	Course code and Title	Learning Outcome
BSc. BT FY	BBt-101 Fundamentals of Chemistry-I	This course presents an introduction to the Periodic Table, stoichiometry, chemical states, chemical equilibria, Acid & base, oxidation & reduction reactions, chemical kinetics, inorganic nomenclature and chemical bonding.
	BBt-102 Fundamentals of Physics	This course provides a thorough introduction to the principles and methods of physics for students who have good preparation in physics and mathematics. Emphasis is placed on problem solving and quantitative reasoning. This course covers Newtonian mechanics, special relativity, gravitation, thermodynamics, and waves.
	BBt-103 Biochemistry I	This course presents the chemical reactions or metabolic functions in the living system and their regulations. This subject will be useful to make the student to understand the concept of biochemical regulations. On successful completion of the subject study the students will understand Basic Structure and metabolism of Biomolecules.
	BBt-104 Biophysics	This paper will enable application of the theories and laws of physics to biological structure and functioning and to understand the principles and working of instruments commonly used to study biological material.
	BBt-105 Animal Sciences I	At the end of this paper study, students will understand the relevance, basic concepts and functions of animals and animal systems, basic physiology as can be utilized for understanding

		advanced concepts later in the course. Main goal of this paper is to understand the basic concepts and approaches to study animal biology. To understand about alternates for animal biological material as can be utilized to understand the structure and functions of biological systems.
	BBt-106 Plant Sciences I	This paper presents basic concepts and functions of plants and plant systems, Plant body parts and its structures in detail.
	BBt-107 Microbiology I	The main outcome of this paper is to understand the relevance and basic concepts of microbiology, to understand the classification, physiology and importance of microbes and to understand the health-care implications of microbes.
	BBt-108 Biomathematics and Biostatistics-I	At the end of this paper students will understand the relevance, basic concepts and theories statistics. They will know to utilize the knowledge on relevance, basic concepts and theories of statistics as can be applied to life sciences. Learning outcome are to understand statistics concepts, theories and formulae, to utilize the bio-mathematics and biostatistics tools for applications in the areas of life sciences in general and human health in particular.
BSc. BT SY- Semester-I	Bb- 211 A Genetics & B Immunology	This course presents the way characters get transferred through generations and methods to analyze and modify them. Students will understand the concept of genes and their behavior. On successful completion of the subject the student will understood the Basic genetics and their role. This course presents the basic defense mechanism of animals. On successful completion of the subject Immunology, the student will understand: Immunity, Antigen, Antibody, Cells of immune

		system and their function and regulations
	Bb- 212 Cell Biology	This course presents the types and structural details of the basic unit by which all the living things are made of (the cell). This will helpful to make the student to understand the concept of cell and their activities. This course presents the types and structural details of the basic unit by which all the living things are made of (the cell). The concept of cell and their activities and molecular signaling is the aim of this subject.
	Bb- 213 Environmental Biology and Biotechnology	This course presents the Study and the Management of the Environment. Ecology and Conservation of the Environment is main output of this. On successful completion of the subject the student will understood Ecosystem, energy flow and Uses and values of Biodiversity
BSc. BT SY- Semester II	Bb- 221 Molecular biology	This course presents the genetics at molecular level On successful completion of the subject the student should have understood the molecular aspects of Molecular biology.
	Bb- 222 Animal and Plant development	The specific objectives of this course are to expose students to the topics such as to Summarize the role of each cell structure in plant and animal development, to evaluate the importance of various plant and animal tissues in development, to Summarize the contribution of each organ within the plant and animal body. This paper also useful to evaluate the stages of plant and animal growth and development, its structural and functional organization.
	Bb- 223 Scientific writing and communication	At the end of this paper students will learn to Understand the science writing and editing process and be able to write a variety of technical documents in an acceptable level of Standard

		American English and to write technical and workplace documents by applying the appropriate categorical modes of rhetorical composition.
	Bb- 224 Metabolic Pathways	Students will be able to demonstrate an understanding of fundamental biochemical principles, metabolic pathways and the regulation of biochemical processes. They will be able to describe the three major ways cells regulate metabolic pathways, to describe the distinct metabolic pathways used by cells to harvest the energy stored in glucose under aerobic conditions and also know the specific locations of these pathways in a generalized eukaryotic cell. This subject's main outcome is to understand the chemical relationship between the glucose molecules used by cells as fuel and the carbon dioxide generated by the same cells as waste.
BSc. BT TY- Semester I	Bb-331 Microbial Biotechnology	This subject introduces students to microbial biotechnology, the use of microbes to generate useful products or to degrade wastes (bioremediation). Examples include the microbial production of enzymes (e.g. amylase), antibiotics (e.g. penicillin) or hormones (e.g. human insulin), and the development of microbial strains that are highly efficient at catabolising natural organic compounds or synthetic chemical compounds. Microbial biotechnology overlaps with the recently developing field of designer bacteria, the so-called 'synthetic microbiology', where large sections of a microbial genome are engineered in order to optimize the metabolism for specific purposes.
	Bb-332 Plant and animal tissue culture	This course presents the application of Plants and animals in Biotechnology. Student will understand usage of Plant and Animal products and exploitation

		of them in Biotechnology. On successful completion of the subject, the student should have understood: Crop development, Callus culture, Biotechnological applications of plants, Animal tissue culture, Animal products, production & improvement of them
	Bb- 333 Biodiversity & Systematics	This course presents the principles Components of Biodiversity (Ecosystem, Genetic and Species diversity) - Assigning values to biodiversity - Species concepts - Animal diversity: (Distribution, inventory, species richness) - Biodiversity Hotspots (Western Ghats, Indo-Burma region).
BSc. BT TY- Semester II	Bb-341 Large scale Manufacturing process	This paper presents the basics of fermentation technology, media components as applied to lab scale, pilot scale and industrial scale upstream and downstream processing. This paper is introduced to acquire requisite skills for the design and development of bioreactors, production optimization, and preparation of sterile base materials for downstream processing. On successful completion of the course the students should have understood the basics of fermentation technology and learnt the concept of screening, optimization and maintenance of cultures.
	Bb- 342 Biochemical and biophysical techniques	Upon completion of this course, the students will be able to disciplinary knowledge and understanding of biochemistry, structure and function of biological molecules. Students will learn about various membranes, their properties and appropriate uses. They will understand the concept of dialysis and reverse dialysis techniques, lyophilization techniques along with their application. They will be able to assess the suitability of chromatographic techniques for solving specific bioanalytical

		problems and critically apply the knowledge for biomolecules separation.
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Course: MSC BIOTECHNOLOGY		Outcomes
Course	Course code and Title	Learning outcomes
M.Sc. BT FY- Semester-I	MBT-101 Advanced Biological Chemistry	Students will acquire a sound background of latest methods used in biochemistry for purification of enzymes, isolation and characterization of proteins, nucleic acids, etc. Students will also develop practical skills related to applications of microscopy, labeling DNA, proteins and whole cells and their applications in biochemistry research. The students will get equipped with the latest techniques used in analysis of biomolecules and this will help them in undertaking further research in the area of biochemistry in any research/industrial institution.
	MBT- 102 Cell & Molecular Biology	Cell biology subject presents the types and structural details of the basic unit by which all the living things are made of (the cell). Main goal of this is to make the student to understand the concept of cell and their activities. This course presents the types and structural details of the basic unit by which all the living things are made of (the cell). Molecular Biology course presents the genetics at molecular level. On successful completion of the subject the student should have understood the molecular aspects of Molecular biology.
	MBT- 103 Genetics & Immunology	This course presents about Section culture and maintenance, Identification of Mutants - Physical and Chemical Methods, Experiments to determine Mendel's law, Monohybrid and dihybrid cross using plants, Sex chromatin (buccal smear) and Skill Based

		<p>Subject.</p> <p>Immunology subject presents the basic defense mechanism of animals. Main aim of the subject is to make the student to understand the concept immunology .On successful completion of the subject the student will understand: Immunity, Antigen, Antibody, Cells of immune system and their function and regulation</p>
	<p>MBT-105 Environmental Biotechnology</p>	<p>At the end of the course the students will be able to, Apply the concepts of Biotechnology in Environmental Management, and Describe the concept of pollution management, Waste management and global warming problems.</p>
<p>M.Sc. BT FY- Semester-II</p>	<p>MBT-201 Genetic Engineering</p>	<p>This course presents the mechanism of gene manipulation Concept of gene manipulation and gene transfer technologies are the main points in this syllabus. On successful completion of the subject, the student should have understood: Manipulation of genes, Transfer techniques, Expression systems and methods of selection.</p>
	<p>MBT-202 Bacteriology and Virology</p>	<p>Bacteriology involves the identification, classification, and characterization of various bacterial species. Virology is the study of viruses, complexes of nucleic acids and proteins that have the capacity for replication in animal, plant and bacterial cells. Students will know about diagnosis, management and prevention of infection.</p>
	<p>MBT-203 Plant Biotechnology</p>	<p>This course presents the application of Plants in Biotechnology. Usage of Plant products and exploitation of them in Biotechnology students. On successful completion of the subject, the student should have understood: Crop development, Callus culture, Biotechnological applications of plants.</p>

	<p style="text-align: center;">MBT-205 Clinical Research, Data Base management, & IPR</p>	<p>Students will understand the importance for measuring and obtaining the safety and data necessary for seeking marketing approval of drugs and devices. Will also know to IPRs role in the innovation process and managements of required documents. Upon completion of the course the student shall be able to have gained knowledge and understanding of what is involved in the design of a database. They will have gained knowledge and understanding of the models used for structuring data in database system and also able to implement a database and report on the process.</p>
<p style="text-align: center;">M.Sc. BT SY- Semester- III</p>	<p style="text-align: center;">BT 301 Animal Biotechnology</p>	<p>This course will describe to students about the limitations and challenges facing the animal industries and disciplines, various biotechnologies available to the animal related fields, Explain how developments in biotechnology may have applications in those fields.</p>
	<p style="text-align: center;">BT 302 Bioprocess engineering & Fermentation Technology</p>	<p>Students will learn different types of fermentation process, strain improvement methods and isolation of industrial important microorganisms, Different recovery process of the final product formed, Fermenters, design of fermenters and Application of fermentation.</p>
	<p style="text-align: center;">BT 303 Data Base Management and IPR in Biotechnology</p>	<p>The paper will describes the management and sharing of all data and code associated with the grant, including software dissemination and release schedule, source code development and open source licensing, software documentation, reproducible framework and data annotation and dissemination. IPR will provide knowledge that how health care companies with a means to protect their claim to and ownership of these assets through common law, state law or federal law.</p>

	<p>BT 304 Advanced Genetics</p>	<p>On the completion of this paper students will able to demonstrate and apply knowledge of contemporary areas of molecular genetics and biotechnology, and the challenges faced, to Illustrate and explain how transgenic organisms are produced via genome manipulation across a range of species. They will also learn source, synthesize and critically analyse literature to form the basis of a project, Independently design and implement experimental approaches to solve a research problem in genetics and biotechnology, to demonstrate proficiency in molecular genetics laboratory techniques, in problem-solving and experimental design, and in data collection, analysis, interpretation and presentation.</p>
	<p>BT 305 Bioinformatics</p>	<p>This paper useful for students to learn the basic concepts of Bioinformatics and its significance in Biological data analysis, Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics. This will explain about the methods to characterize and manage the different types of Biological data Classify different types of Biological Databases.</p>
<p>M.Sc. BT SY- Semester- IV</p>	<p>BT 401 Genomics and Proteomics</p>	<p>This paper presents the basics of: mapping, Genome sequencing, Genome sequence assembly: Base calling and assembly programs, Genome annotation: Gene ontology, Automated genome annotation, Annotation of hypothetical proteins and Genome economy. Comparative genomics: Whole genome alignment, Finding a minimal genome, Lateral gene transfer, Within-genome approach and Gene order and Gene.</p>
	<p>BT 402 Biochemical and biophysical techniques</p>	<p>This course presents the principles and applications of Biotechnology explaining the biomolecules and applications of biophysical methods. Main goal is to</p>

		<p>enable the students to learn the immuno techniques and radio labeling techniques. On successful completion of the course the students will be aware of 1. Microscopic techniques 2. Electro physiological methods. 3. Biomolecules structure determination using X-ray diffraction.</p>
	<p>BT 405 Stem Cell Technology and Regenerative Medicines</p>	<p>This paper will make the students to understand that how the Stem cells are able to renew themselves through mitotic cell division and differentiate into a diverse range of specialized cell types also their use in therapy and regenerative medicine as well as in toxicity screening and drug development is widely anticipated.</p>