

<b>M.Sc (Biotechnology) (2 Yrs) - NCTE APPROVED</b>			
Programme Objectives	<ol style="list-style-type: none"> <li>1. Students will understand and analyze the importance of biotechnology and its principles as they relate to create good environmental society.</li> <li>2. To learn the fundamental principles and its development in all sources.</li> <li>3. Students will demonstrate proficiency through knowledge and acquired skills.</li> <li>4. Understand the concept and applied knowledge of life science.</li> <li>5. To create an eco friendly atmosphere with the learned concepts.</li> </ol>		
Programme Specific Outcome	<ol style="list-style-type: none"> <li>1. To impart theoretical and practical knowledge and skills that underpins the various branches of Biotechnology.</li> <li>2. To enable the students to have a thorough understanding and knowledge of different branches of Biotechnology.</li> <li>3. To make the students to develop the ability to think analytically and solve problems.</li> <li>4. To understand and utilize the various training methods.</li> <li>5. To understand the difference between old biotechnology and modern biotechnology</li> <li>6. Design an experiment with step-by-step instructions to address a research problem.</li> <li>7. Provide examples of current applications of biotechnology and advances in the different areas like medical, microbial, environmental and bioremediation.</li> <li>8. Upon successful completion of this course, the students can definitely recognize the foundations of modern biotechnology and explain the principles that form the basis for recombinant technology.</li> </ol>		
<b>Course Outcome</b>			
S.No	Sub.code	Title	Course Outcome
1	LBTC11	Cell Biology	To understand macromolecule interaction, signaling, their role in the aging, cancer and small molecules which modulate the cell cycle machinery.
2	LBTC12	Biochemistry	To understand about macromolecules and their interactions for different reactions in the cells.
3	LBTC13	Microbiology	Having clear views on the importance and applications of microbes in everyday life
4	LBTC14	Genetics	Having clear views on genetic diseases, molecular routes of the problem.
5	LBTLA	Cell biology, Biochemistry, Microbiology and Genetics	To understand and solve the problems in the area of cell biology, biochemistry, microbiology and genetics.
6	LBTEA	Analytical Techniques in	To understand and use the advance

		Biotechnology (ATB)	analytical instruments which are useful to solve biological problems.
7	LBTEB	Biomedical Technology (BMT)	To understand the diagnosis and molecular details of varieties of diseases.
8	LBTEC	Cancer Biology	To understand the molecular reason for the disease cancer, treatment possibilities and further research directions on the cancer biology.
9	LBTC21	Molecular Biology	To understand the concepts of macromolecules interactions in synthesis of different molecules.
10	LBTC22	Genetic Engineering	To understand and use reagents, techniques in gene manipulation.
11	LBTC23	Immunology	Having clear views on the importance of immune system at molecular level and diseases associated with immune system.
12	LBTC24	Computational Biology	Ability to apply the statistical concepts for their research work.
13	LBTLB	Molecular Biology, Genetic Engineering, Immunology and Bioinformatics	To understand and solve the problems in the area of Molecular biology, Genetic Engineering, Immunology and Bioinformatics.
14	LBTED	Marine Biotechnology	Ability to understand the values of marine ecosystem.
15	LBTEE	Food Technology	To understand different techniques of food processing, analysis, packing and storage and also to apply the techniques to process, pack and store our locally available traditional food.
16	LBTEF	Pharmaceutical Technology	To understand different small molecules and their applications and side effects also try to apply the techniques to understand our traditional knowledge on medicine.
17	LBTC31	Animal Biotechnology	To understand different techniques of animal genome editing and properties of stem cells.
18	LBTC32	Plant Biotechnology	To understand and apply different techniques of plant genome editing and tissue culture facilities.
19	LBTC33	Bio Process Technology	To understand the industry and manufacture of bio-products.
20	LBTC34	Environmental Biotechnology	To understand the values of clean environment.
21	LBTLC	Animal Biotechnology, Plant Biotechnology, Bioprocess Technology and Environmental	To understand and solve the problems in the area of Animal Biotechnology, Plant Biotechnology, Bioprocess Technology

		Biotechnology	and Environmental Biotechnology.
22	LBTEG	Nanobiology	To understand the nano-materials and their biological applications.
23	LBTEH	Medical Biotechnology	To understand the molecular depth of different pathogens and diseases caused by them.
24	LBTEI	Stem cells & regenerative Biology	To understand the difference between stem cells and other cell types along with the available techniques to study the stem cells.
25	LBTC41	Research Methodology and Biostatistics	To attain the courage to carry over research independently
26	LBTC42	Bioethics, IPR and Entrepreneurship	To understand and apply the regulation of bioethics and policies of IPR.
27	LBTP41	Project	To understand the ground reality of biological problems; they will be trained in the area of literature survey; required techniques; data collection, quality & reproducibility of data, preparation of proposal, reports and manuscript.
28	LBTSA	DNA Finger printing	To understand the basics of cell & molecular biology and the reason for the differences in the appearances of people.
29	LBTSB	Stem cells and regenerative biology	To understand the differences between stem cells and other cell types and have a thorough learning on the available techniques to study the stem cells.
30	LBTSC	Vermi Biotechnology	To understand the importance of solid waste management and the methods to convert wastes to useful products.
31	LBTSD	Cancer Biology	To understand the complexity of cancer and available small molecules as cancer drug.
32	LBTSE	Biotechnology and Human Health	To understand the prevention, possible treatment choice and social responsibilities during disease outbreak.

**MANONMANIAM SUNDARANAR UNIVERSITY**

**TIRUNELVELI - 627 012**

**DEPARTMENT OF BIOTECHNOLOGY**

**Integrated M.Sc Biotechnology (5 years)**

**Objectives**

- ★ To impart theoretical and practical knowledge and skills that underpins the various branches of Biotechnology
- ★ To enable the students to have a thorough understanding and knowledge of different branches of Biotechnology
- ★ To make the students to develop the ability to think analytically and solve problems.

**Programme Specific Outcome**

1. To have an insight on the biodiversity and understand their economic values.
2. To obtain a clear information on biomolecules and their functions.
3. To nourish the mind with diagnosis of infectious agents, prevention and treatment.
4. To learn the fundamentals of biotechnology.
5. To have an in depth knowledge about human genetics.
6. To promote the understanding of the basic mechanism of plant and animal cells, their culture.
7. To enrich the students with bioinformatics informations.
8. To study the nanoparticles and their role in industry and environment.
9. To understand the approach to perform research, thesis writing.
10. To attain a crystal clear information about patents.

## Course Outcome

S.No	Subject	Outcome
1	Fundamentals of Biodiversity	To have an insight on biodiversity types, hot spots, bioresources, economic values of biodiversity
2	Fundamentals of Cell Biology	Understanding the origin of life on earth, knowing the plant and animal cell structures, biogenesis of cellular organelles, insight of prokaryotic cell structure, function and modes of transport occurring in the cells.
3	Biochemistry - I	To have clear background information concerned with biomolecules - carbohydrates, lipids, proteins with their classifications coupled with enzyme kinetics.
4	Basic Microbiology	To create a thorough knowledge on microorganisms, their anatomy, mode of multiplication, metabolism, diagnosis and treatment.
5	Fundamentals of Biotechnology	To understand the fundamentals of biotechnology at molecular level in different fields concerned with medical and industrial concepts.
6	Biochemistry - II	To provide basic informations on metabolism of carbohydrates, lipids, amino acids.
7	Introduction to Genetics	To enrich the minds with concepts concerned with gene, chromosome, mutational types and human genetics.
8	Plant Physiology	To nurture the students with plant cells, photosynthesis, respiration, transpiration, plant hormones and stress biology of plants.
9	Principles of Molecular Biology	To understand the basic principles of molecular biology from DNA as genetic material to protein synthesis and regulation.
10	Animal Physiology	To equip the mind with the entire systems viz., digestion, cardiovascular system, excretion, nerve and muscles and endocrine glands with a view to gain a thorough input.
11	Microbial Physiology	To understand the nutritional requirements of microorganisms coupled with their growth phases, different metabolic pathways in addition to photosynthesis and anaerobic respiration.

12	Immunology	To know the basics on immune cells, immunity, antigen antibody reactions, hypersensitivity to allergens and major histocompatibility complex.
13	Nutritional Biotechnology	To provide a basic knowledge on the nutritional biotechnology especially concerned with the carbohydrates, proteins, nucleic acids, vitamins and minerals.
14	Basic Bioinformatics	To enrich the students with basic bioinformatics information's such as data types, data storage, retrieval, sequence alignments and gene expression patterns in pro and eukaryotes.
15	Medical Biotechnology	To study overview, scope and benefits of medical biotechnology, infectious diseases, mechanism of drugs against the diseases and future of medical biotechnology.
16	Enzyme Technology	To understand the historical perspective and nomenclature of enzymes, enzymes kinetics, catalysis, molecular mechanisms of enzyme catalysis and regulation of enzyme activity.
17	Molecular Biology	To study the molecular biology, structure of prokaryotic and eukaryotic gene, translation, recombination, applications of structural genomics and construction of genomic library.
18	Applied Microbiology	To study the airspora of indoor and outdoor environment, techniques to trap air borne microorganisms, concept and scope of agricultural microbiology, soil microbiology, food microbiology.
19	Analytical Techniques	To study the microscopy and its types, radioisotope techniques, chromatographic methods, electrophoresis and centrifugation techniques.
20	Genetic Engineering	To study the nuclease enzymes, types on restriction enzymes, cloning vectors, polymerase chain reaction, blotting techniques, DNA sequencing, mutagenesis and genome editing.
21	Food Biotechnology	To understand the scope of food biotechnology, source of food, preservation techniques, fermentation, types of fermentation, food quality and control, food waste disposal and methods to analyze the food samples.

22	Nano Biotechnology	To study the applications of nanomaterials in biotechnology, nanomaterials, classification of nanomaterials and characterization techniques.
23	Genomics and Proteomics	To study the introduction about genome, protein, gene and protein sequence analysis methods, gene and protein data bank.
24	Agricultural Biotechnology	To study the physical and chemical characterization of soil, micro flora, microbial interaction, biopesticides and bio-geo chemical cycles.
25	Animal Biotechnology	To study the basic introduction about animal cell culture, media and growth factors for animal cell culture.
26	Plant Biotechnology	To study the plant tissue culture, techniques in preparation of nutrient media for plant tissue culture, germplasm conservation and micropropagation.
27	Industrial Biotechnology	To study the preparation process of fermented products, types of fermenters, downstream processing and industrial production of ethyl alcohol, vitamins and enzymes.
28	Environmental Biotechnology	To understand the interaction between the environment and biota, food chain and environmental pollution. It includes the methods to eradicate the heavy metals, oil and pest by using the biotechnological techniques.
29	Research Methodology	To study the methods to do an innovative research. Also, it covers types of research, sources for literature survey, how to write a research project proposal and scientific papers.
30	Bioethics, IPR and Entrepreneurship	To study the risks, ethics and safety of biotechnology based research and products related to human health care, agriculture, animals.