

# CENTRAL UNIVERSITY OF SOUTH BIHAR



## **Master of Science in Biotechnology (M.Sc Biotechnology) Programme Syllabus**

*(Effective from Academic Session 2019-2020)*

**Department of Biotechnology  
SCHOOL OF EARTH, BIOLOGICAL AND  
ENVIRONMENTAL SCIENCES**

**Central University of South Bihar**  
**Department of Biotechnology**  
**Proposed Course Structure for M. Sc. Biotechnology**  
**Course Duration: 2 years [4 Semesters] (100 Credits)**

The Department of Biotechnology is currently offering M. Sc. Biotechnology. The Programme includes well-designed theory and practical courses. Innovation-based training is the key to train students with a special emphasis on understanding the basic as well as modern concepts in biological processes for pursuing research in frontier areas of Biological Sciences. The Programme equips students with deep theoretical as well as practical understanding of different aspects of Biological processes and promote them to take on an integrative approach for their studies and research.

Biotechnology has emerged as a major thrust in the field of science and technology having potential to boost the economy of several countries including India. The voice of global Biotechnology in 21st century is to transfer the bio-based technology from “Lab to Land and from Bench to Business” to bring the cost of bio-based commodities within the reach of common man. The courses in Biotechnology Programme are mainly related to recent and emerging trends in Biology but the students are also taught Biostatistics which enables them to analyse their data, draw meaningful conclusions and publish in reputed journals. The Programme equally gives emphasis on integrated approaches in human health, recombinant DNA technology, transgenic development, bioremediation and informatics. Students work directly with faculty on real-world projects, gaining hands-on skills necessary to solve emerging problems.

Department of Biotechnology is equipped with state-of-the-art technology and equipment that provide a stimulating environment for teaching and research.

### **Biotechnology Programme**

#### **M. Sc. Biotechnology Programme**

The two year (four semesters) Post-Graduate Programme has interdisciplinary approach with participation of faculty/researchers across the University based on CBCS pattern. Hands-on training with professional and management skills are keys to our teaching pedagogy. This Programme focuses on responsibility building and ethics in research and policy. We are equally giving emphasis on integrated approaches in human health, transgenic crop development, environmental sciences and informatics. The course also comprises of project dissertation, presentation and comprehensive viva-voce as part of evaluation system. Students also visit major research institutes in the form of educational/excursion tour and Biotechnology industries to learn various aspects of product developments. One of the major goals of the Biotechnology Programme is to engage students by actively involving them in cutting-edge research.

Currently, departmental research is mainly focussed in the areas of Cancer Biology, Autoimmune Diseases, Fungal Diseases, Lung Physiology, Neuroethology, Immunology, Genetic Engineering, Stem Cell Therapy, Proteomics, Molecular Biology, Signal Transduction, Interferon (IFNs) Transcription Factors, Neuroimaging, Electrophysiology, Biochemistry of Fungal Pathogens and Genesis of Secondary

Metabolites as well as Genetic manipulations of Plants which include Plant Tissue Culture and Molecular Marker Developments. Apart from above advantages, M.Sc. Biotechnology Programme prepares the students to be the leaders in research, policy and business.

### Biotechnology Laboratory

Biotechnology Laboratory is equipped with state of the art technology and equipment that provide a stimulating environment for teaching and research. The list includes Biosafety Cabinets, Laminar Air Flow, Autoclave, Water bath with wide temperature ranges, Dry Block Heater (Heating Block), Rotatory Shaker, Stackable Incubator Shaker, Cell Sonicator, Many types of Microscopes (Fluorescence, Inverted, Compound), various types of refrigerated Centrifuges, Nano Drop UV/VIS Spectrophotometer, ELISA Plate Reader, Spectrophotometer, Gradient Thermal Cycler, Real-Time PCR, UV/VIS Transilluminator, Gel Documentation Systems, Electrophoresis units (Horizontal and Vertical), Blot Transfer System, Deep Freezers (-20<sup>0</sup> C and -86<sup>0</sup> C), Ice-Flakes Machine, Cryo-Can, Lyophilizer, Complete Milli-Q Water System etc. Facilities for animal, plant and microbial culture work are also available.

#### Core Courses

Course Code	Courses	Credits		
		L	T	P
<b>Core</b>		<b>Semester I</b>		
MSBTN1001C04	Cell Biology & Genetics	3	1	0
MSBTN1002C04	Biomolecules & Biochemistry	3	1	0
MSBTN1003C04	Instrumentation: Tools & Techniques in Biotechnology	3	1	0
MSBTN1004C04	Bioinformatics and Biostatistics	3	1	0
MSBTN1005C04	Lab 1 related to MSBTN1001C04 + MSBTN1002C04+ MSBTN1003C04	0	1	3
		<b>Semester II</b>		
MSBTN2001C04	Molecular Biology and Genomics	3	1	0
MSBTN2002C04	Microbiology	3	1	0
MSBTN2003C04	Enzymology	3	1	0
MSBTN2004C04	Biology of Immune System	3	1	0
MSBTN2005C04	Lab 2 related to MSBTN2001C04+ MSBTN2002C04	0	1	3
MSBTN2006C04	Lab 3 related to MSBTN2003C04+ MSBTN2004C04	0	1	3
		<b>Semester III</b>		
MSBTN3001C04	Recombinant DNA Technology	3	1	0
MSBTN3002C04	Bioprocess Engineering	3	1	0
MSBTN3003C04	Animal Biotechnology	3	1	0
MSBTN3004C04	Plant Biotechnology	3	1	0
MSBTN3005C04	Lab 4 related to MSBTN3001C04+ MSBTN3002C04	0	1	3
MSBTN3006C04	Lab 5 related to MSBTN3003C04+ MSBTN3004C04	0	1	3

		<b>Semester IV</b>		
MSBTN4001C16	Project Dissertation, Presentation and Comprehensive Viva-voce#	<b>0</b>	<b>2</b>	<b>14</b>
Total Credit for Core Course		<b>84</b>		

# The student shall carry out the dissertation work outside CUSB or as recommended by DC. Department will provide the recommendation letters for the same. However, they have to follow the academic calendar of the CUSB.

### Elective Courses

Course Code	Courses	Credits		
		L	T	P
<b>Elective</b>	<b>Any Four to be chosen (Two from parent Department and Two from Other Department)</b>			
MSBTN1001E04	Biodiversity and Ecobiotechnology**	<b>3</b>	<b>1</b>	<b>0</b>
MSBTN1002E04	Metabolism and Metabolic Engineering	<b>3</b>	<b>1</b>	<b>0</b>
MSBTN2001E04	Cancer Biology *	<b>3</b>	<b>1</b>	<b>0</b>
MSBTN2002E04	IPR, Bioethics and Biosafety **	<b>3</b>	<b>1</b>	<b>0</b>
MSBTN2003E04	Neuroscience*	<b>3</b>	<b>1</b>	<b>0</b>
MSBTN3001E04	Neurological Diseases and Techniques*	<b>3</b>	<b>1</b>	<b>0</b>
MSBTN3002E04	Techniques in Molecular Diagnostics and stem Cell Technology	<b>3</b>	<b>1</b>	<b>0</b>
Total Credit for Elective Course		<b>16</b>		

\* Can be offered to other Dept. within school

\*\* Can be offered to other School

### Skill Courses (Non-Credits)

Skill Based Electives		L	T	P
MSBTN3001S00	<i>Drosophila</i> Techniques	<b>0</b>	<b>0</b>	<b>0</b>
MSBTN3002S00	Village Based Skills	<b>0</b>	<b>0</b>	<b>0</b>
MSBTN3003S00	Field and Excursion Tour	<b>0</b>	<b>0</b>	<b>0</b>

Swayam/Self Study Based Courses (Non – Credits) Course Code	Courses	L	T	P
		MSBTN1001S02	Introductory Mathematical Methods for Biologists	
MSBTN2001S02	Bio-energetics of Life Processes			
MSBTN3001S02	Principles of Downstream Techniques in Bioprocess			
MSBTN4004S02	Human Molecular Genetics			

Note - Swayam based courses are updated regularly and students can opt any other updated courses even if it is not mentioned in the list given above.