

**Annexure – I**

**CENTRAL UNIVERSITY OF SOUTH BIHAR**



**Master of Science in Biotechnology (M.Sc. Biotechnology) Programme  
Syllabus  
(Effective from Academic Session 2022-2023)**

**Department of Biotechnology  
School of Earth, Biological and Environmental Sciences**

**August 5, 2022**

**Central University of South Bihar**  
**Department of Biotechnology**  
**Proposed Course Structure for M. Sc. Biotechnology as per NEP 2020**  
**Course Duration: 2 years [4 Semesters] (80 Credits)**

The Department of Biotechnology is currently offering M.Sc. Degree in 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 equip the 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 area 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 program are mainly related to recent and emerging trends in Biology but the students are also taught Research Methodology which enables them to analyse their data, draw meaningful conclusions and publishing in reputed journals. The Programme equally gives emphasis on integrated approaches to human health, recombinant DNA technology, transgenic development, infection and immunity and bioinformatics. Students work directly with faculty on real-time projects, gaining hands-on skills necessary to solve emerging problems.

Department of Biotechnology is equipped with state-of-the-art equipment and continue to upgrade its infrastructure that provide a stimulating environment for teaching and research.

### **Degree in Biotechnology**

#### **M. Sc. Degree in Biotechnology**

The two year (four semesters) Post-Graduate Programme in Biotechnology has interdisciplinary approach with participation of faculty and researchers across the University based on NEP2020 pattern with an option of exit after one year leading to Post Graduate diploma in Biotechnology. Hands-on training with professional and management skills are keys to our teaching pedagogy. This programme focuses on to build the students a responsible educator/researcher and follow ethics in research and policy. We are equally giving emphasis on integrated approaches to human health, transgenic crop development, environmental sciences, skill development and bioinformatics. The course also comprised of project dissertation, presentation and comprehensive viva-voce as part of evaluation system. There is option of entry in the second year M.Sc program (3<sup>rd</sup> semester) provided the student fulfill the eligibility criteria completing the 4-year Bachelor degree in Research subject to availability of the seat in the department. Students are also visiting major research institutions in the form of educational/excursion tour and Biotechnology industries to provide them opportunity to learn various aspects of process and product developments. One of the major goals of the Biotechnology programme is to engage the students by actively involving them in cutting-edge research and development.

Currently, departmental research is mainly focused in the areas of Antimicrobial Resistance, Biofilm, Behavioral Neuroscience, Cancer Biology, Fabrication of Bioplastics, Genetic Engineering, Genesis of Secondary Metabolites, Immunology, Molecular Marker Development, Molecular Diagnostics, Microbial Diversity, Stem Cell Therapy, Signal Transduction, and Transcription Factors. Apart from the above activities, M.Sc. Biotechnology Programme prepares the students to be the leaders in research, policy writing and business entrepreneur.

#### **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, Low temperature circulatory water bath, Dry Heating Block, Rotatory

Shaker, Stackable Incubator Shaker, Sonicator, Compound, Fluorescence, and Inverted Microscopes, refrigerated centrifuges, microcentrifuge, Nano Drop UV/VIS Spectrophotometer, ELISA Plate Reader, Spectrophotometer, Gradient Thermal Cycler, Real-Time PCR, UV/VIS Transilluminator, Gel Documentation Systems, Horizontal and Vertical gel electrophoresis, Trans-Blot System, Hybridization oven, Deep Freezers (-20<sup>0</sup> C and -86<sup>0</sup> C), Flow cytometer, HPLC, Ice-Flake Machine, Cryo-Can, Lyophilizer, Milli-Q Water System. Animal, plant and microbial culture are also available but need upgradation to BSL2/BSL3 level and other infrastructures.

### Discipline Based Core Course (DBCC)

Course Code	Courses	Credits		
		L	T	P
<b>Semester I</b>				
BTN 8 1 DC 001 04	Cell & Molecular Biology	3	0	1
BTN 8 1 DC 002 04	Biochemistry	3	0	1
BTN 8 1 DC 003 04	Tools & Techniques in Biotechnology	3	0	1
BTN 8 1 DC 004 04	Introductory Course on Research Methodology (Including Bioinformatics and Biostatistics) (Research Methodology, compulsory in 1 <sup>st</sup> Semester instead of 2 <sup>nd</sup> Semester)	3	1	0
<b>DBCC Credit</b>		<b>16</b>		
<b>Semester II</b>				
BTN 8 2 DC 005 04	Microbiology ( <b>Indian Knowledge System</b> )	3	1	0
BTN 8 2 DC 006 04	Immunology & Immunotechniques ( <b>Vocational Course</b> )	3	1	0
BTN 8 2 DC 007 04	Enzymology & Enzyme technology	3	0	1
BTN 8 2 DC 008 02	Practicals in Microbiology	0	0	2
BTN 8 2 DC 009 02	Practicals in Immunology & Immunotechniques	0	0	2
<b>DBCC Credit</b>		<b>16</b>		
<b>Semester III</b>				
BTN 9 1 DC 001 04	Recombinant DNA Technology	3	0	1
BTN 9 1 DC 002 04	Bioprocess Engineering	3	0	1
BTN 9 1 DC 003 04	Animal Biotechnology ( <b>Value addition</b> )	3	0	1
BTN 9 1 DC 004 04	Plant Biotechnology ( <b>Skill Enhancement</b> )	3	0	1
<b>DBCC Credit</b>		<b>16</b>		
<b>Semester IV</b>				
BTN 9 2 DC 005 20	Project Dissertation <sup>#</sup>	0	0	20
<b>DBCC Credit</b>		<b>20</b>		
<b>Total Credit for Discipline Based Core Course</b>		<b>68</b>		

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

**Discipline Based Core Elective (DBCE), Open Elective Interdisciplinary Course (OEIC)**

Course Code	Code	Courses	Credits		
			L	T	P
<b>Elective Course</b>		<b>Any three electives in one and half years of M.Sc Program to be chosen. (i) One from parent Department i.e., DBCE and (ii) Two from Other Department/School (OEIC)</b>			
		<b>Semester I</b>			
BTN 8 1 OE 010 04	OEIC	Biodiversity, Conservation and Environmental Biotechnology	3	1	0
BTN 8 1 DE 011 04	DBCE	Developmental Biology	3	1	0
		<b>Semester II</b>			
BTN 8 2 OE 012 04	OEIC	Neuroscience	3	1	0
BTN 8 2 DE 013 04	DBCE	Cancer Biology	3	1	0
		<b>Semester III</b>			
BTN 9 1 DE 006 04	DBCE	Molecular Diagnostics and Stem Cell Technology	3	0	1
		<b>Semester IV</b>			
BTN 9 2 OE 007 04	OEIC	IPR, Bioethics and Biosafety	3	1	0
DBCE taken by student			4		
OEIC taken by student			8		
<b>Total Credit for Elective Course (DBCE and OEIC)</b>			<b>12</b>		

**Mandatory Elective Noncredit Course (MENC)**

	<b>MENC designed by Department</b>	L	T	P
BTN 8 1 ME 014 00	<i>Drosophila</i> as a Research Model	1	0	1
BTN 8 2 ME 015 00	Summer Training* (for 2 <sup>nd</sup> Semester students during summer vacation)	0	0	2
BTN 9 1 ME 008 00	Village Based Skills (Whole Department)	0	0	2
BTN 9 1 ME 009 00	Field and Excursion Tour (Whole Department)	0	0	2
	<b>MENC on Swayam</b>			
	Introductory Mathematical Methods for Biologists			
	Bio-energetics of Life Processes			
	Principles of Downstream Techniques in Bioprocess			
	Human Molecular Genetics			

**Note:** Swayam based courses are updated regularly and students can select any other updated courses even if it is not mentioned in the list given above. But they should follow the criteria of 2 non-credit course either alone or in combination of two courses. \* Summer Training will be under MENC category for 2<sup>nd</sup> Semester only.