



**DEPARTMENT OF BIOTECHNOLOGY**

**UNIVERSITY OF KASHMIR**

**(NAAC Accredited Grade A<sup>+</sup>)**

**BIOTECHNOLOGY CURRICULUM**

**FOR**

**M.Sc. IN BIOTECHNOLOGY**

**SPONSORED BY DEPARTMENT OF  
BIOTECHNOLOGY (DBT), MINISTRY OF SCIENCE  
AND TECHNOLOGY, GOVERNMENT OF INDIA**

**(EFFECTIVE FROM, 2023)**

## **CURRICULUM OVERVIEW**

The curriculum is based on choice based credit system (CBCS), spanning four semesters. The students have to obtain 24 credits in each semester. Out of 24 credits, 22 credits have to be obtained from the department of Biotechnology, while 2 credits are required to obtain either from other departments of school of Biological sciences (Named as “Generic elective” (GE), or from any other department of university other than the departments of Biological Sciences (Named as “Open elective” (OE).

The semester I, II and III are based on class teaching, tutorials and laboratory courses, while semester IV is exclusively devoted to 6 months of research project work.

### **Glossary of terms used in the curriculum**

**One Credit:** 16 hours of Lecturers (L) or 32 hours of Tutorial (T) or 32 hours of practical(P)

**IA:** Internal Assessment

**SEE:** Semester End Examination

**CR:** Core

**DCE:** Discipline centric

**GE:** Generic Elective

**OE:** Open Elective

### **Program Objective**

The M.Sc Biotechnology course offered by the department of Biotechnology, University of Kashmir objective is to utilize the academic expertise and research training of its faculty members in providing the platform for imparting highest level of knowledge in the field of biotechnology to the post graduate students. The curriculum structure is designed in a manner so as to provide in first semester the basic knowledge about the cellular, molecular, immunological and metabolic aspects of the living cells. In the subsequent semester two and three, the courses offered orients the students towards the biotechnology specialization, like genetic engineering, plant biotechnology and Bioprocess engineering and fermentation technology. The aim of these courses is to abreast students with latest concepts in the field of biotechnology. The 4th semester research-training objective is to provide research orientation to students.

### **Program outcome**

After completion of the M.Sc Biotechnology course, the students will possess fundamental concepts of cellular functioning at the molecular level. The students will be able to understand how metabolic pathways operate in the human cells and their significance in physiological and pathophysiological aspects. The immune biology concepts will help students to understand how human body interacts with pathogens and how immune intervention can be helpful in treating various communicable diseases. The students will get to know how genetic engineering and recombinant DNA techniques can be utilized to manipulate animal and plant genomes for the betterment of human welfare. The environmental biotechnology course will help students to understand and implement the biological means in providing safe and clean environment. The Bioethical and biosafety courses will make students aware about the ethical and safety means required during implementation of biotechnological research interventions. Finally, the students will be able to develop research skills and training to explore their abilities as potential scientists.

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**Syllabus for Choice Based Credit Courses for M Sc. in Biotechnology.(2023 onwards)**

Semester	S. No.	Course type	Course Code	Course Title	Credit distribution			Total Credits	Internal assessment Marks	Semester end marks	Total marks
					L	T	P				
First	1	Core (CR)	BT23101 CR	Cell Biology	3	1	0	4	20	80	100
	2		BT23102 CR	Molecular Biology-I	3	1	0	4	20	80	100
	3		BT23103 CR	Immune Biology	3	1	0	4	20	80	100
	4		BT23104 CR	Biomolecules	2	0	0	2	10	40	50
	5	Discipline centric (DCE)	BT23101 DCE	Biotechniques	2	1	0	3	15	60	75
	6		BT23102 DCE	Biostatistics	2	0	0	2	10	40	50
	7.		BT23103 DCE	Laboratory Course-I	0	0	3	3	15	60	75
	8.	Generic elective (GE)	BT23001 GE	Biochemical techniques	2	0	0	2	10	40	50
	9	Open Elective (OE)	BT23001 OE	Introduction to cancer Biology	2	0	0	2	10	40	50
Second	1	Core (CR)	BT23201 CR	Animal cell Science and Technology	3	1	0	4	20	80	100
	2		BT23202 CR	Molecular Biology-II	3	1	0	4	20	80	100
	3		BT23203 CR	Advanced Enzymology	3	1	0	4	20	80	100
	4		BT23204 CR	Environmental Biotechnology	2	0	0	2	10	40	50
	5	Discipline centric (DCE)	BT23201 DCE	Microbiology	2	0	0	2	10	40	50
	6		BT23202 DCE	Intermediary Metabolism	2	1		3	15	60	75
	7		BT23203 DCE	Laboratory Course-II	0	0	3	3	15	60	75
	8	Generic Elective (GE)	BT23002 GE	Redox Biology	2	0	0	2	10	40	50
	9	Open Elective (OE)	BT23002 OE	Nutritional Biotechnology	2	0	0	2	10	40	50

Third	1	Core (CR)	BT23301 CR	Genetic Engineering	3	1	0	4	20	80	100
	2		BT23302 CR	Plant Biotechnology	3	1	0	4	20	80	100
	3		BT23303 CR	Bioprocess Engineering and Fermentation Technology	3	1	0	4	20	80	100
	4		BT23304 CR	Human Genetics	2	0	0	2	10	40	50
	5	Discipline centric (DCE)	BT23301 DCE	Bioethics, Biosafety and Intellectual Property Rights.	2	0	0	2	10	40	50
	6		BT23302 DCE	Systems and computational Biology	2	1	0	3	15	60	75
	7		BT23303 DCE	Laboratory Course-III	0	0	3	3	15	60	75
	8	Generic Elective (GE)	BT23003 GE	Molecular Mechanism of Plant Life	2	0	0	2	10	40	50
	9	Generic Elective (GE)	BT23004 GE	Cancer Immunology	2	0	0	2	10	40	50
Fourth											
	1	Core (CR)	BT23401 CR	Proposal Writing	1	0	0	1	0	25	25
	2		BT23402 CR	Research Based project	0	0	14	14	70	280	350
	3		BT23403 CR	Seminar and Journal Club	0	2	0	2	10	40	50
	4		BT23404 CR	Project presentation	0	3	0	3	15	60	75
	5		BT23405 CR	Project viva	0	2	0	2	0	50	50
	6.	Generic elective (GE)	BT23005 GE	Basic Recombinant DNA Technology	2	0	0	2	10	40	50
7	Open elective	BT23003 OE	Bioethics	2	0	0	2	10	40	50	