

BS Biological Sciences Curriculum (2023 onward)

Semester 1

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT1000	Introduction to Biological Sciences and Engineering	3	0	0	0	6	9	S
2	CY1001	Chemistry I	3	1	0	0	6	10	S
3	CS1100	Introduction to Programming	3	0	0	3	6	12	E
4	MA1101	Functions of Several Variables	3	1	0	0	6	10	S
5	PH1010	Physics 1	3	1	0	0	6	10	S
6	PH1030	Physics Lab	0	0	0	3	1	4	S
7	GN1101	Life Skills	0	0	0	0	2	0	
8	ID1200	Ecology and Environment	0	0	0	0	2	0	
		Total Credits						55	

Semester 2

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA	Mathematics Elective [^]	3	1	0	0	6	10	S
2	PH1020	Physics 2	3	1	0	0	6	10	S
3	CY1051	Chemistry 2	3	0	0	0	6	9	S
4	PH2070	Introduction to Biological Physics	3	0	0	0	6	9	S
5	BT2030	Biochemistry	3	0	0	0	6	9	P
6	CY1002	Chemistry Lab	0	0	0	3	0	3	S
7	GN1102	Life Skills	0	0	0	0	1	0	
8		NCC (NC1010)/NSS (NS1020)/NSO (NS1030)	0	0	0	0	2	0	
		Total Credits:						50	

[^]**Restricted elective:** Students choose between MA1102 Series and Matrices, MA2020 Differential Equations, MA2040 Probability, Statistics and Stochastic Process, MA2130 Basic Graph Theory

Semester 3

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HSE1	Humanities 1	3	0	0	0	6	9	H
2	BT2010	Microbiology	3	0	0	0	6	9	P
3	BT2042	Fundamentals of Biophysical Chemistry	3	0	0	0	6	9	P
4	BT2082	Cell Biology	3	0	0	0	6	9	P
5	BT2012	Genetics	3	0	0	0	6	9	P
6	BT2122	Biochemistry Lab	0	0	0	6	2	8	P
		Total Credits:						53	

Semester 4

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HSE2	Humanities 2	3	0	0	0	6	9	H
2	BT3012	Molecular Biology	3	0	0	0	6	9	P
3	BT2020	Numerical Methods for Biology	2	1	0	0	6	9	P
4	BT2022	Biostatistics	3	1	0	0	6	10	P
5	BT5330	Human Physiology	3	0	0	0	6	9	P
6	BT2112	Microbiology Lab	0	0	0	6	2	8	P
		Total Credits:						54	

Semester 5

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT3020	Structural Biology	3	0	0	0	6	9	P
2	BT3072	Immunology	3	0	0	0	6	9	P
3	BT3122	Molecular Biology Lab	0	0	0	6	2	8	P
		Total Credits:						26	

Semester 6

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT3040	Bioinformatics	2	0	0	3	6	11	P
2	BT5240	Computational Systems Biology	3	0	0	1	8	12	P
3	BT3022	Genomics and Proteomics	3	0	0	0	6	9	P
		Total Credits:						32	

Summer

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT3900	Summer Internship (Optional)	0	0	0	0	20	0	P
		Total Credits:						0	

Semester 7

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HSE3	Humanities 3	3	0	0	0	6	9	H
		Total Credits:						9	

Semester 8

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HS3050	Professional Ethics	2	0	0	0	0	0	H
		Total Credits:						0	

Semester-wise distribution of credits

Semester	I	II	III	IV	V	VI	Sum	VII	VIII	Total
Credits	55	50	53	54	26*	32*	0	9*	0*	432

*Indicated credits are only for the core program. In addition, students are required to earn 189 elective credits during semesters V-VIII. 81 of the elective credits must be earned from the Department of Biotechnology. The remaining 72 credits can be from any department, including Biotechnology.

Suggested Elective credits: 27 each in Semesters V and VI, 45 in Semester VII, and 54 in Semester VIII.

Project: An optional BS project can be taken in any department in lieu of 27 elective credits. These 27 credits can be counted against 27 professional elective credits mentioned above only if the project is done in the Department of Biotechnology.

Category-wise credit requirements for BS

Category	Engineering (E)	Professional (P) Core+Elective	Humanities (H)	Sciences (S) Core+Elective	Unallocated credits	Total
Credits	12	156+81	27	74+10	72	432

BS (Honours): (Total credit requirement: $432 + 27 = 459$)

- **Eligibility:** minimum CGPA of 8.5 at the end of 5th sem without U or W grade in any course. They need to maintain these conditions until graduation.
- **Extra credit requirement:**
 - BS project (27 credits) must be completed in the Department of Biotechnology.
 - Additional 27 credits must be earned from 5000 level or above courses from Biotechnology.

Category-wise credit requirements for BS (Honors)

Category	Engineering (E)	Professional (P) Core+Elective+Project	Humanities (H)	Sciences (S) Core+Elective	Unallocated credits	Total
Credits	12	156+81*+27	27	74+10	72	432

*27 out of these 81 credits must be earned from 5000 level or higher courses from Biotechnology.

BS Biological Sciences Curriculum (2023 onward)

Semester 1

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT1000	Introduction to Biological Sciences and Engineering	3	0	0	0	6	9	S
2	CY1001	Chemistry I	3	1	0	0	6	10	S
3	CS1100	Introduction to Programming	3	0	0	3	6	12	E
4	MA1101	Functions of Several Variables	3	1	0	0	6	10	S
5	PH1010	Physics 1	3	1	0	0	6	10	S
6	PH1030	Physics Lab	0	0	0	3	1	4	S
7	GN1101	Life Skills	0	0	0	0	2	0	
8	ID1200	Ecology and Environment	0	0	0	0	2	0	
		Total Credits						55	

Semester 2

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	MA	Mathematics Elective [^]	3	1	0	0	6	10	S
2	PH1020	Physics 2	3	1	0	0	6	10	S
3	CY1051	Chemistry 2	3	0	0	0	6	9	S
4	PH2070	Introduction to Biological Physics	3	0	0	0	6	9	S
5	BT2030	Biochemistry	3	0	0	0	6	9	P
6	CY1002	Chemistry Lab	0	0	0	3	0	3	S
7	GN1102	Life Skills	0	0	0	0	1	0	
8		NCC (NC1010)/NSS (NS1020)/NSO (NS1030)	0	0	0	0	2	0	
		Total Credits:						50	

[^]**Restricted elective:** Students choose between MA1102 Series and Matrices, MA2020 Differential Equations, MA2040 Probability, Statistics and Stochastic Process, MA2130 Basic Graph Theory

Semester 3

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HSE1	Humanities 1	3	0	0	0	6	9	H
2	BT2010	Microbiology	3	0	0	0	6	9	P
3	BT2042	Fundamentals of Biophysical Chemistry	3	0	0	0	6	9	P
4	BT2082	Cell Biology	3	0	0	0	6	9	P
5	BT2012	Genetics	3	0	0	0	6	9	P
6	BT2122	Biochemistry Lab	0	0	0	6	2	8	P
		Total Credits:						53	

Semester 4

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HSE2	Humanities 2	3	0	0	0	6	9	H
2	BT3012	Molecular Biology	3	0	0	0	6	9	P
3	BT2020	Numerical Methods for Biology	2	1	0	0	6	9	P
4	BT2022	Biostatistics	3	1	0	0	6	10	P
5	BT5330	Human Physiology	3	0	0	0	6	9	P
6	BT2112	Microbiology Lab	0	0	0	6	2	8	P
		Total Credits:						54	

Semester 5

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT3020	Structural Biology	3	0	0	0	6	9	P
2	BT3072	Immunology	3	0	0	0	6	9	P
3	BT3122	Molecular Biology Lab	0	0	0	6	2	8	P
		Total Credits:						26	

Semester 6

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT3040	Bioinformatics	2	0	0	3	6	11	P
2	BT5240	Computational Systems Biology	3	0	0	1	8	12	P
3	BT3022	Genomics and Proteomics	3	0	0	0	6	9	P
		Total Credits:						32	

Summer

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT3900	Summer Internship (Optional)	0	0	0	0	20	0	P
		Total Credits:						0	

Semester 7

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HSE3	Humanities 3	3	0	0	0	6	9	H
		Total Credits:						9	

Semester 8

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	HS3050	Professional Ethics	2	0	0	0	0	0	H
		Total Credits:						0	

Summer

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT5801**	Project					25	25**	P
		Total Credits:						25	

Semester 9

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT5802**	Project					20	20**	P
		Total Credits:						20	

Semester 10

S.No	Course No	Course Name	L	T	E	P	O	C	Cat
1	BT5803	Project					40	40	P
		Total Credits:						40	

**Grades for BT5801 and BT5802 will be awarded together at the end of Semester 9. At the end of the 9th Semester, if the student obtains a grade lower than 'B', the project must be dropped in the 10th Semester. The remaining credit requirements must be earned through Professional electives.

Semester-wise distribution of credits

Semester	I	II	III	IV	V	VI	Sum	VII	VIII	Sum	IX	X	Total
Credits	55	50	53	54	26*	32*	0	9*	0*	25	20*	40*	553

*Indicated credits are only for the core program. In addition, students are required to earn 189 elective credits during semesters V-X. 117 of the elective credits (including at least 36 from 5000 level or above courses) must be earned from the Department of Biotechnology. The remaining 72 credits can be from any department, including Biotechnology.

Suggested Elective credits: 27 each in Semesters V and VI, 45 in Semester VII, 54 in Semester VIII, 27 in Semester IX, and 9 in Semester X.

Category-wise credit requirements for BS+MS

Category	Engineering (E)	Professional (P) Core+Elective+Project	Humanities (H)	Sciences (S) Core+Elective	Unallocated credits	Total
Credits	12	156+117+85	27	74+10	72	553

BS (Honours)+MS: (Total credit requirement: 553 + 27 = 580)

- *Eligibility:* minimum CGPA of 8.5 at the end of 5th sem without U or W grade in any course. They need to maintain these conditions until graduation.
- *Extra credit requirement:* Additional 27 credits must be earned from 5000 level or above courses from Biotechnology.

Category-wise credit requirements for BS (Honors)

Category	Engineering (E)	Professional (P) Core+Elective+Project	Humanities (H)	Sciences (S) Core+Elective	Unallocated credits	Total
Credits	12	156+144*+85	27	74+10	72	580

*63 out of these 144 credits must be earned from 5000 level or higher courses from Biotechnology.

Criteria for stream change at the DD level

Students who opt for stream change at the DD level, i.e., BS (Biol. Sci.) + MTech (Biol. Engg.) must fulfil the following additional criteria to complete the requirements of the DD program.

- Must complete at least 4 Professional courses from a basket of stream-specific courses listed in the table below.
- These credits can be earned in lieu of the prescribed Professional elective credits.
- Credits are to be earned by the end of the 7th semester.
- All other rules for DD upgrade options apply.

Course basket for upgradation from BS (Biol. Sci.) to BS (Biol.Sci.) + MTech (Biol. Engg.)

S. No.	Course No.	Course Name
1	BT1020	Material and Energy Balances
2	BT2041	Bioreaction Engineering
3	BT2061	Biochemical Thermodynamics
4	BT3051	Data Structure and Algorithms for Biology
5	BT5061	Cellular Engineering
6	BT5051	Transport Phenomena in Biological Systems
7	BT5011	Biomaterials Engineering