

### Course Components of Academic Programme

#### B. Tech. Biotechnology / B. Tech. Biotechnology (Hons.) with Specialization in Computer Science & Biology

Minimum Duration : 08 Semesters (4 Years)

Maximum Duration :12 Semesters (6Years)

Total Number of Credits:173 Credits (+20 Additional credits for Hons. Program)\*\*

	<u>Course Components</u>	<u>Credits</u>
1.	<u>Compulsory Course</u>	
I.	Foundation Courses(FC)	37
II.	Professional Core Courses (CC)	60
2.	<u>Elective Course**</u>	
I.	Discipline Centric Elective (DE)	13
II.	Generic Elective(GE)	12
III.	Open Elective(OE)	9
3.	<u>Discipline-Centric Ability Enhancement Course</u>	
I.	Seminar(SM)	05
II.	Project Work(PJ)	16
III.	Career skill (CK)	08
IV.	Comprehensive Viva-Voce (CM)	01
4.	<u>Generic Courses/Institutional Courses</u>	
I.	Environmental Sciences(EV)	02
II.	Healthy Living and Fitness(HF)	01
III.	General Proficiency(GP)	08

 (Dr. Asheesh Gupta)	 (Dr. Saroj Mishra)	 (Dr. Ramkrishna Gupta)	 (Dr. Navin Kumar)	 (Dr. Pallavi Singh)
 (Prof. Nishant Rai)	 (Dr. Devesh Pratap)	 (Dr. Pankaj Gautam)	 (Dr. Kumud Pant)	 (Dr. Amit Gupta)
 (Dr. Jigisha Anand)	 (Dr. Yashaswi Singh)	 (Er. Prateek)	 (Dr. Pramod Rawat)	 (Dr. Privank Vyas)

**Requirement of Awards of Degree:-CGPA>= 4.5 Clearance of total no. of credits as 170Credits (+ 20 Additional credits for Hons.) and any other condition as per regulation and ordinances**

 (Dr. <u>Asheesh</u> Gupta)	 (Dr. <u>Saroj</u> Mishra)	 (Dr. <u>Ramkrishna</u> Gupta)	 (Dr. <u>Navin</u> Kumar)	 (Dr. <u>Pallavi</u> Singh)
 (Prof. <u>Nishant</u> Rai)	 (Dr. <u>Devesh</u> Pratap)	 (Dr. <u>Pankaj</u> Gautam)	 (Dr. <u>Kumud</u> Pant)	 (Dr. <u>Amit</u> Gupta)
 (Dr. <u>Jigisha</u> Anand)	 (Dr. <u>Yashaswi</u> Singh)	 (Er. <u>Prateek</u> )	 (Dr. <u>Pramod</u> Rawat)	 (Dr. <u>Privank</u> Vyas)

## SEMESTER: I

COURSEMODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
THU-101	Professional Communication	FC	2	2	-	-	25	25	50	100
TCH-101	Engineering Chemistry	FC	3	3	-	-	25	25	50	100
EEC-101	Basic Electrical & Electronics Engineering	FC	4	3	1	-	25	25	50	100
TEV-101	Environmental Science	EV	2	2	-	-	25	25	50	100
TCS-101	Fundamentals of Computer & Introduction to Programming	FC	3	3	-	-	25	25	50	100
PCH-151	Chemistry Lab	FC	1	-	-	2	25	25	50	100
PME-153	Engg. Graphics & Design Lab	FC	3	1	-	4	-	-	-	100
PCS-151	Computer Lab-I	FC	2	-	-	4	25	25	50	100
EEC-151	Basic Electrical & Electronics Engineering Lab	FC	1	-	-	2	25	25	50	100
GP-101	General Proficiency	GP	1	-	-	-	-	-	-	
<b>Total</b>			<b>22</b>	<b>14</b>	<b>1</b>	<b>12</b>	<b>200</b>	<b>200</b>	<b>400</b>	<b>900</b>

L:Lecture, T:Tutorial, P:Practical, CWA:Continuous Work Assessment, MSE: Mid Semester Examination, ESE: End Semester Examination

  
 (Dr. Asheesh Gupta)

  
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 (Er. Prateek)

  
 (Dr. Pramod Rawat)

  
 (Dr. Priyank Vyas)

## SEMESTER:II

COURSEMODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
THU-201	Advanced Professional Communication	FC	2	2	-	-	25	25	50	100
TPH-201	Engineering Physics	FC	3	3	-	-	25	25	50	100
MAB-201	Engineering Mathematics	FC	4	3	1	-	25	25	50	100
TCS-201	Programming for Problem Solving	FC	3	3	-	-	25	25	50	100
BTE-201	Advanced Organic Chemistry	FC	3	3	-	-	25	25	50	100
THF-201	Healthy Living & Fitness	HF	1	1	-	-	25	25	50	100
PPH-221	Physics Lab	FC	1	-	-	2	-	-	-	100
PCS-251	Computer Lab-II	FC	2	-	-	4	25	25	50	100
GP-201	General Proficiency	GP	1	-	-	-	-	-	-	
<b>Total</b>			<b>20</b>	<b>15</b>	<b>1</b>	<b>6</b>	<b>175</b>	<b>175</b>	<b>350</b>	<b>800</b>

  
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**SEMESTER III**

COURSEMODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
TBT-301	Genetics and Molecular Biology	CC	3	3	-	-	25	25	50	100
TBT-302	Cell Biology	CC	3	3	-	-	25	25	50	100
TBT-303	Microbiology	CC	3	3	-	-	25	25	50	100
TBT-304	Biochemistry	CC	3	3	-	-	25	25	50	100
TBT-305	Elective-A*(Generic Elective)	GE	3	2	1	1	25	25	50	100
XCS-301	Career Skills	CK	2	2	-	-	25	25	50	100
SBT-301	Seminar	SM	1	-	-	-	-	-	-	100
PBT-301	Genetics and Molecular Biology Laboratory	CC	1	-	-	2	25	25	50	100
PBT-302	Cell Biology Laboratory	CC	1	-	-	2	25	25	50	100
PBT-303	Microbiology Laboratory	CC	1	-	-	2	25	25	50	100
PBT-304	Biochemistry Laboratory	CC	1	-	-	2	25	25	50	100
GP-301	General Proficiency	GP	1	-	-	-	-	-	-	100
<b>Total</b>			<b>24*/20</b>							<b>1200* /1100</b>

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  (Dr. Privank Vyas)

\*Elective-A courses are the additional courses only for the student opting B. Tech. (Hons.) Biotechnology with Specialization in Computer Science & Biology. List of electives is given in Table- 2 at the end of the scheme.

 (Dr. <u>Asheesh</u> Gupta)	 (Dr. <u>Saroj</u> Mishra)	 (Dr. <u>Ramkrishna</u> Gupta)	 (Dr. <u>Navin</u> Kumar)	 (Dr. <u>Pallavi</u> Singh)
 (Prof. <u>Nishant</u> Rai)	 (Dr. <u>Devesh</u> Pratap)	 (Dr. <u>Pankaj</u> Gautam)	 (Dr. <u>Kumud</u> Pant)	 (Dr. <u>Amit</u> Gupta)
 (Dr. <u>Jigisha</u> Anand)	 (Dr. <u>Yashaswi</u> Singh)	 (Er. <u>Prateek</u> )	 (Dr. <u>Pramod</u> Rawat)	 (Dr. <u>Privank</u> Vyas)

**SEMESTER IV**

COURSE/MODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
TBT-401	Biophysics	CC	3	3	-	-	25	25	50	100
TBT-402	Immunology and Immuno technology	CC	3	3	-	-	25	25	50	100
TBT-403	Bio analytical Techniques	CC	3	3	-	-	25	25	50	100
TBT-404	Environmental Biotechnology	CC	3	3	-	-	25	25	50	100
TBT-405	Elective-I (Open Elective)	OE	3	2	1	-	25	25	50	100
TBT-406	Elective-B*(Generic Elective)	GE	3	2	1	1	25	25	50	100
XCS-401	Career Skills	CK	2	2	-	-	25	25	50	100
SBT-401	Seminar	SM	1	-	-	-	-	-	-	100
PBT-402	Immunology and Immuno technology Lab	CC	1	-	-	2	25	25	50	100
PBT-405	Comprehensive viva voce	CM	1	-	-	-	-	-	-	100
GP-401	General Proficiency	GP	1	-	-	-	-	-	-	100
<b>Total</b>										<b>1100*/1000</b>

  
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	25*/21							
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\*Elective-B courses are the additional courses only for the student opting B. Tech.(Hons.) Biotechnology with Specialization in Computer Science & Biology. List of electives is given in

				
(Dr. <u>Asheesh Gupta</u> )	(Dr. <u>Saroj Mishra</u> )	(Dr. <u>Ramkrishna Gupta</u> )	(Dr. <u>Navin Kumar</u> )	(Dr. <u>Pallavi Singh</u> )
				
(Prof. <u>Nishant Rai</u> )	(Dr. <u>Devesh Pratap</u> )	(Dr. <u>Pankaj Gautam</u> )	(Dr. <u>Kumud Pant</u> )	(Dr. <u>Amit Gupta</u> )
				
(Dr. <u>Jigisha Anand</u> )	(Dr. <u>Yashaswi Singh</u> )	(Er. <u>Prateek</u> )	(Dr. <u>Pramod Rawat</u> )	(Dr. <u>Privank Vyas</u> )

**SEMESTER - V**

COURSEMODULE				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
TBT-501	Recombinant DNA Technology	CC	3	3	-	-	25	25	50	100
TBT-502	Bioprocess Engineering	CC	3	2	1	-	25	25	50	100
TBT-503	Bioinformatics	CC	3	3	-	-	25	25	50	100
TBT-504	Elective-II (Discipline Centric Elective)	DE	3	3	-	-	25	25	50	100
TBT-505	Elective-III (Generic Elective)	GE	3	2	1	-	25	25	50	100
TBT-506	Elective-C*	DE	3	2	1	1	25	25	50	100
XCS-501	Career Skills	CK	2	2	-	-	25	25	50	100
SBT-501	Seminar	SM	1	-	-	-	-	-	-	100
PBT-501	Recombinant DNA Technology Lab	CC	1	-	-	2	25	25	50	100
PBT-502	Bioprocess Engineering Lab	CC	1	-	-	2	25	25	50	100
PBT-503	Bioinformatics Lab	CC	1	-	-	2	25	25	50	100
PBT-504	Elective-II Laboratory	DE	1	-	-	2	25	25	50	100
PBT-505	Elective-III Laboratory	GE	1	-	-	2	25	25	50	100
PBT-506	Summer Internship-I	PJ	2	-	-	4				100

  
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GP-501	General Proficiency	GP	1	-	-	-	-	-	-	100
<b>Total</b>			<b>30*/2 6</b>							<b>1500* /1400</b>

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 (Dr. <u>Asheesh Gupta</u> )	 (Dr. <u>Saroj Mishra</u> )	 (Dr. <u>Ramkrishna Gupta</u> )	 (Dr. <u>Navin Kumar</u> )	 (Dr. <u>Pallavi Singh</u> )
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 (Dr. <u>Jigisha Anand</u> )	 (Dr. <u>Yashaswi Singh</u> )	 (Er. <u>Prateek</u> )	 (Dr. <u>Pramod Rawat</u> )	 (Dr. <u>Privank Vyas</u> )

**SEMESTER VI**

				TEACHING PERIODS			WEIGHTAGE: EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
TBT-601	Animal Biotechnology	CC	3	3	-	-	25	25	50	100
TBT-602	Plant Biotechnology	CC	3	3	-	-	25	25	50	100
TBT-603	Bio separation Technology	CC	3	3	-	-	25	25	50	100
TBT-604	Elective-IV	DE	3	3	-	-	25	25	50	100
TBT-605	Elective-V	GE	3	2	1	-	25	25	50	100
TBT-606	Elective-D*	GE	3	2	1	1	25	25	50	100
XCS-601	Career Skills	CK	2	2	-	-	25	25	50	100
SBT-601	Seminar	SM	1	-	-	-	-	-	-	100
PBT-601	Animal Biotechnology Lab	CC	1	-	-	2	25	25	50	100
PBT-602	Plant Biotechnology Lab	CC	1	-	-	2	25	25	50	100
PBT-603	Bio separation Technology Lab	CC	1	-	-	2	25	25	50	100
PBT-605	Elective-V Laboratory	GE	1	-	-	2	25	25	50	100
GP-601	General Proficiency	GP	1	-	-	-	-	-	-	100

  
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Total			27*/23							1300*/ 1200
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\*Elective-D courses are the additional courses only for the student opting B. Tech. (Hons.) Biotechnology with Specialization in Computer Science & Biology. List of electives is given in Table-2 at the end of the scheme.

 (Dr. <u>Asheesh Gupta</u> )	 (Dr. <u>Saroj Mishra</u> )	 (Dr. <u>Ramkrishna Gupta</u> )	 (Dr. <u>Navin Kumar</u> )	 (Dr. <u>Pallavi Singh</u> )
 (Prof. <u>Nishant Rai</u> )	 (Dr. <u>Devesh Pratap</u> )	 (Dr. <u>Pankaj Gautam</u> )	 (Dr. <u>Kumud Pant</u> )	 (Dr. <u>Amit Gupta</u> )
 (Dr. <u>Jigisha Anand</u> )	 (Dr. <u>Yashaswi Singh</u> )	 (Er. <u>Prateek</u> )	 (Dr. <u>Pramod Rawat</u> )	 (Dr. <u>Priyank Vyas</u> )

**SEMESTER VII**

COURSEMODULE				TEACHING PERIODS			WEIGHTAGE: E VALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ES E	Total
Code	Title	Component								
TBT-701	Intellectual Property Rights, Bio safety & Bioethics	CC	3	3	-	-	25	25	50	100
TBT-702	Elective-VI	DE	3	3	-	-	25	25	50	100
TBT-703	Elective-VII	DE	3	2	1	-	25	25	50	100
TBT-704	Elective-VIII	GE	3	2	1	-	25	25	50	100
TBT-705	Elective-IX	OE	3	2	1	-	25	25	50	100
TBT-706	Elective-E*	DE/GE	3	2	1	1	25	25	50	100
TBT-708	Research Ethics & Methodology	CC	2	2	-	-	25	25	50	100
SBT-701	Seminar	SM	1	-	-	-	-	-	-	100
PBT-701	Project-I	PJ	2	-	-	-	-	-	-	100

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PBT-704	Elective-VIII Laboratory	GE	1	-	-	2	25	25	50	100
PBT-707	Summer Internship-II	PJ	3	-	-	-	-	-		100
GP-701	General Proficiency	GP	1	-	-	-	-	-	-	100
<b>Total</b>			<b>29*/25</b>							<b>1200*/1100</b>

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**SEMESTER VIII**

COURSE DETAILS			TEACHING PERIODS			WEIGHTAGE: EVALUATION				
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Course	Title	Component								
TBT-801	Omics Technologies	CC	3	3	-	-	25	25	50	100
TBT-802	Elective-X	OE	3	2	1	-	25	25	50	100
PBT-801	Project-II	PJ	9	-	-	-	-	-	-	300
GP-801	General Proficiency	GP	1	-	-	-	-	-	-	100
<b>Total</b>			<b>16</b>	<b>6</b>	<b>1</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>100</b>	<b>600</b>

  
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**Table1. LIST OF ELECTIVES (SUGGESTIVE) IN B.TECH. BIOTECHNOLOGY**

Sr. No.	Semester	Category	Code	Elective Courses	Department offering course
1.	IV	OE	TBT-405	<b><u>Elective-I</u></b> a. Waste Management and Up cycling b. Biology for Engineers c. Biomaterials	BT
2.	V	DE	TBT-504	<b><u>Elective-II(Theory)</u></b> a. Marine Biotechnology b. Stem Cell Technology c. Genome Editing Technology	BT
3	V	DE	PBT-504	<b><u>Elective-II(Lab)</u></b> a. Stem Cell Technology Laboratory b. Genome Editing Technology Laboratory	BT
4.	V	GE	TCS331	<b><u>Elective-III(Theory)</u></b> a. 3 D Printing & Design	CSE/ME
			TME -501	Heat and Mass Transfer	
5	V	GE	PBT-505	<b><u>Elective-III(Lab)</u></b> a. 3 D Printing & Design Laboratory b. Heat and Mass Transfer Laboratory	CSE/ME/ECE
			PME-511		
6.	VI	DE	TBT-604	<b><u>Elective-IV(Theory)</u></b> a. Bio similars Technology b. Biosensor& Bioelectronics c. Microbial Technology	BT
7.	VI	GE	TBT-605	<b><u>Elective-V(Theory)</u></b> Perl	CSE
			TCS-632	Fundamentals of Statistics And Artificial Intelligence	
			TCS-471	Statistical Data Analysis with R	

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8.	VII	DE	TBT-702	<b>Elective-VI(Theory)</b> a. Gene Expression & Transgenics b. Rational Drug Discovery c. Enzyme Technology	BT
9.	VII	DE	TBT-703	<b>Elective-VII(Theory)</b> a. Pharmaceutical Biotechnology b. Tissue Engineering c. Nano Biotechnology	BT
10.	VII	GE	TBT-704	<b>Electives-VIII(Theory)</b> Python	CSE
			TCS-341	Fundamental of Information Security and Block chain	
11	VII		PBT-704	<b>Electives-VIII(LAB)</b> Python Laboratory	CSE
			PCS-341	Fundamental of Information Security and Block chain	
12.	VII	OE	TBT-705	<b>Elective-IX(Theory)</b> a. Bioterrorism & National Security b. Food & Nutrition Science c. Himalayan Biodiversity and Biotechnology	BT
13.	VIII	GE	TBT-802	<b>Elective-X(Theory)</b> a. Project Management b. Entrepreneurship Development	Management

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 (Dr. Jigisha Anand)    
 (Dr. Yashaswi Singh)    
 (Er. Prateek)    
 (Dr. Pramod Rawat)    
 (Dr. Privank Vyas)

**NOTE:**

1. One course is to be chosen from each pool of electives for all B. Tech. programs in Dept. of Biotechnology.
2. Elective-I & Elective-IX are theory elective courses being offered by Dept. of Biotechnology for all other Departments.
3. List of Open Electives & Generic Electives are just suggestive; students can opt any open elective being offered by other departments.

 (Dr. <u>Asheesh Gupta</u> )	 (Dr. <u>Saroj Mishra</u> )	 (Dr. <u>Ramkrishna Gupta</u> )	 (Dr. <u>Navin Kumar</u> )	 (Dr. <u>Pallavi Singh</u> )
 (Prof. <u>Nishant Rai</u> )	 (Dr. <u>Devesh Pratap</u> )	 (Dr. <u>Pankaj Gautam</u> )	 (Dr. <u>Kumud Pant</u> )	 (Dr. <u>Amit Gupta</u> )
 (Dr. <u>Jigisha Anand</u> )	 (Dr. <u>Yashaswi Singh</u> )	 (Er. <u>Prateek</u> )	 (Dr. <u>Pramod Rawat</u> )	 (Dr. <u>Priyank Vyas</u> )

**Table 2: LIST OF ELECTIVES IN B. TECH. (HONS) BIOTECHNOLOGY WITH SPECIALIZATION IN CSB PROGRAM**

Sr. No.	Semester	Category	Code	Course	Department Offering course
1	III	GE	TBT-305	<b><u>Elective-A(Theory)</u></b> Web Programming and Databases	CSE
			TCS-332	Foundations of Data Science (online)	
			TCS-391	Fundamentals of Cyber security	
			TCS 351	Fundamentals of Cloud computing and big data	
			TCS-307	Object Oriented Programming with C++	
			TCS-331	Fundamentals of IoT	
2	IV	GE	TBT-406a	<b><u>Elective-B(Theory)</u></b> Algorithms in Computational Biology	BT/ME/CSE
			TBT-406b	Quantum Computing	
			TCS-408	Java Programming Language	
			TCS-451	Virtualization and Cloud Computing	
			TCS-471	Statistical Data Analysis with R	
			TCS-491	Introduction to Cryptography	
			TCS- 421	Fundamental of Statistics and AI	
3	V*	DE	TBT-506a	<b><u>Elective-C(Theory)</u></b> Synthetic & Systems Biology	BT/CSE
			TBT-506b	Network Biology	
			TCS-503	Data base Management System	
			TCS-509	Machin Learning	
			TCS-552	Cloud Based Application Development and Management	
			TCS-571	Bigdata Visualization	

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  (Dr. Pankaj Gautam)
  (Dr. Kumud Pant)
  (Dr. Amit Gupta)

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4	VI*	GE		<b><u>Elective-D(Theory)</u></b>	CSE/BT/ME
			TCS-632	Artificial Intelligence	
			TMA-402	Computer Based Numerical And Statistical Technique	
			TCS-619	Image Processing And Computer Vision	
5	VII*	DE/GE		<b><u>Elective-E(Theory)</u></b>	CSE/BT
			TBT-706	Computational Genomics & Proteomics	
			TCS-722	Data Warehousing and Data Mining	
			TCS-756	Human Computer Interaction	
			TCS-761	Cloud Infrastructure services	
			TIT- 721	Business Intelligence	
6	VIII*	GE	TCS-821	Soft Computing	CSE
			TCS 822	Mobile Application Development	
			TCS 851	Storage Networks	

**\*NOTE: Applicable for Batch 2020-24 from 5<sup>th</sup> Semester Onwards.**

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**NOTE:**

1. One course is to be chosen from each pool of electives for specialization program of B. Tech. (Hons.) Biotechnology with Specialization in Computer Science & Biology.
2. An extra fee of Rs. 15000/- per semester would be charged from 3<sup>rd</sup> semester onwards for the (Hons.) Program.

 (Dr. <u>Asheesh Gupta</u> )	 (Dr. <u>Saroj Mishra</u> )	 (Dr. <u>Ramkrishna Gupta</u> )	 (Dr. <u>Navin Kumar</u> )	 (Dr. <u>Pallavi Singh</u> )
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