

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech. in BIOTECHNOLOGY
COURSE STRUCTURE & SYLLABUS (R25 Regulations)
Applicable from AY 2025-26 Batch

I Year I Semester (25 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1	BSC	Basic Mathematics/ Fundamentals of Biology	3	1	0	4
2	BSC	Advanced Engineering Physics	3	0	0	3
3	CSC	C Programming and Data Structures/ Programming for Problem Solving	3	0	0	3
4	MEC	Engineering Graphics and Computer Aided Drafting	2	0	2	3
	MEC	Engineering Workshop	0	0	2	1
5	HSC	English for Skill Enhancement	3	0	0	3
6	BSC	Advanced Engineering Physics Lab	0	0	2	1
7	CSC	C Programming and Data Structures Laboratory/ Programming for Problem Solving Laboratory	0	0	2	1
8	HSC	English Language and Communication Skills Laboratory	0	0	2	1
9		Induction Program				
		Total Credits	14	01	10	20

I Year II Semester (24 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1	BSC	Mathematics – II for Biotechnology	3	0	0	3
2	BSC	Applied Chemistry	3	0	0	3
3	CSC	Python Programming	3	0	0	3
4	ESC	Basic Electrical and Electronics Engineering	3	0	0	3
5		Cell Biology	3	0	0	3
6		Engineering Mechanics/Applied Mechanics	3	0	0	3
7	BSC	Chemistry Laboratory for Engineers	0	0	2	1
8	CSC	Python Programming Laboratory	0	0	2	1
9	ESC	Basic Electrical Engineering Laboratory	0	0	2	1
		Total Credits	18	0	06	21

II YEAR I SEMESTER (25 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1	BSC	Mathematics – III for Biotechnology	3	0	0	3
2		Biochemistry	3	0	0	3
3		Microbiology	3	0	0	3
4		Fluid Mechanics & Heat Transfer	3	0	0	3
5		Genetics & Molecular Biology	3	0	0	3
6	BSC	Mathematics – III for Biotechnology Lab	0	0	2	1
7		Biochemistry and Microbiology Laboratory	0	0	2	1
8		Fluid Mechanics & Heat Transfer Laboratory	0	0	2	1
9		Molecular Biology Laboratory	0	0	2	1
10	SDC	Skill Development Course – 1 (Computer based)	0	0	2	1
		Total Credits	15	0	10	20

II YEAR II SEMESTER (25 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1		Analytical Techniques in Biotechnology	3	0	0	3
2		Genetic Engineering	3	0	0	3
3		Chemical and Biochemical Thermodynamics	3	0	0	3
4		Enzyme Engineering and Technology	3	0	0	3
5		Artificial Intelligence and Machine Learning	2	0	0	2
		Innovation and Entrepreneurship	2	0	0	2
6		Analytical Techniques & Enzyme Engineering and Technology Laboratory	0	0	2	1
7		Genetic Engineering Laboratory	0	0	2	1
8		Artificial Intelligence and Machine Learning Laboratory	0	0	2	1
9	SDC	Skill Development Course – 2 (Biotechnology related)	0	0	2	1
10	MC	Indian Knowledge System	1	0	0	1
		Total Credits	17	0	08	21

III YEAR I SEMESTER (27 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1		Chemical Reaction Engineering	3	0	0	3
2		Bioprocess Engineering	3	0	0	3
3		Bioinformatics	3	0	0	3
4		Professional Elective-I	3	0	0	3
5		Open Elective-I	2	0	0	2
6		Chemical Reaction Engineering Laboratory	0	0	2	1
7		Bioprocess Engineering Laboratory	0	0	2	1
8		Bioinformatics Laboratory	0	0	2	1
9		Field Based Project/ Internship	0	0	4	2
10	SDC	Skill Development Course – 3 (Biotechnology related)	0	0	2	1
11	MC	Gender Sensitization Lab*	0.5	0	0	0.5
		Human Values and Professional Ethics*	0.5	0	0	0.5
		Total Credits	15	0	12	21

***Note:** For the courses **Gender Sensitization Lab** and **Human Values and Professional Ethics**- one hour of instruction will be conducted on alternate weeks. For example, if a one-hour class for Gender Sensitization Lab is conducted this week, then a one-hour class for Constitution of India will be conducted in the following week.

III YEAR II SEMESTER (25 Hours)

S. No	Course Code	Course Title	L	T	P	Credits
1		Plant Biotechnology	3	0	0	3
2		Mass Transfer Operations	3	0	0	3
3		Fundamentals of Management for Engineers/ Business Economics and Financial Analysis/ Organizational Behaviour	3	0	0	3
4		Professional Elective-II	3	0	0	3
5		Open Elective – II	2	0	0	2
6		Plant Biotechnology Laboratory	0	0	2	1

7		Mass Transfer Operations Laboratory	0	0	2	1
8		Professional Elective – II Laboratory	0	0	2	1
9	HSC	Advanced English Communication Skills Laboratory	0	0	2	1
10	SDC	Skill Development Course – 4 (Biotechnology related)	0	0	2	1
11	MC	Environmental Science	1	0	0	1
		Total Credits	15	0	10	20

IV YEAR I SEMESTER (25 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1		Animal Cell Science and Technology	3	0	0	3
2		Down Stream Processing	3	0	0	3
3		Fundamentals of Management for Engineers/ Business Economics and Financial Analysis/ Organizational Behaviour	3	0	0	3
4		Professional Elective-III	3	0	0	3
5		Professional Elective – IV	3	0	0	3
6		Open Elective – III	2	0	0	2
7		Animal Cell Science and Technology Laboratory	0	0	2	1
8		Down Stream Processing Laboratory	0	0	2	1
9		Industry Oriented Mini Project/ Summer Internship	0	0	4	2
		Total Credits	17	0	08	21

IV YEAR II SEMESTER (34 Hours)

S. No.	Course Code	Course Title	L	T	P	Credits
1		Professional Elective – V	3	0	0	3
2		Professional Elective – VI	3	0	0	3
3		Project Work	0	0	28	14
		Total Credits	6	0	28	20

***Note:** Students who wish to exit after II Year II Semester has to register for this optional course and acquire the credits allotted by doing 6 weeks Work-based Vocational Course/ Internship or Apprenticeship. Please refer R25 Academic Regulations for more information.

Professional Elective - I

1	Food Biotechnology
2	Bio Materials
3	Bioethics, Biosafety, Biosecurity and IPR

Professional Elective – II (Theory & Laboratory)

1	Immunology/ Immunology Laboratory
2	Industrial Biotechnology/ Industrial Biotechnology Laboratory
3	Environmental Biotechnology/Environmental Biotechnology Laboratory

Professional Elective-III

1	Regulatory Affairs: GLP, GMP and Clinical Trials
2	Biosensors

3	Bioprocess Instrumentation and Control
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Professional Elective-IV

1	Cancer Biology
2	Bioreactor Design and Analysis
3	Sustainable Engineering in Biotechnology

Professional Elective-V

1	Computer Aided Drug Design
2	Biopharmaceutical Technology
3	Bioprocess Modeling, Simulation and Optimization

Professional Elective-VI

1	AI Interventions in Biotechnology
2	Molecular Toxicology
3	Tissue Engineering

OPEN ELECTIVES

Open Elective-I:

1	Biology for Engineers
2	Bioremediation.

Open Elective-II:

1	Human Physiology
2	Biological Information Systems

Open Elective-III:

1	Fermentation Technology
2	Nano-Biotechnology