



**PERIYAR MANIAMMAI INSTITUTE OF
SCIENCE & TECHNOLOGY**
Periyar Nagar, Vallam, Thanjavur - 613403
Tamil Nadu, India.

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BIOTECHNOLOGY

B.Tech Biotechnology

Curriculum (Semesters I to VIII)

Regulations 2024

PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY
B.Tech. Biotechnology
CURRICULUM – REGULATIONS 2024

Category of courses and minimum credit requirement for B.Tech. Biotechnology programme as per Regulations 2024 are outlined below:

Sl. No.	Category of Courses	Credits
1.	Foundation Courses (Humanities and Social Sciences including Management Courses, Basic Science and Engineering Science Courses)	61
2.	Professional Core Courses	59
3.	Professional Elective Courses	18
4.	Open Elective Courses and Indian Knowledge System	09
5.	Online Courses	06
6.	Employability Enhancement Courses (Value-added, Community Engagement and Social Responsibility, Skill Development Courses, Soft and Managerial Skills, Internship, Mini-projects, and Capstone project)	27
7.	Audit Courses*	---
	Total Credits	180

***Note:** Audit Courses such as Life Science, Environmental Science, Indian History etc., shall be introduced as they mandate the requirement of Outcome Based Education.

SEMESTER I

Sl.No.	Course Code	Course Name	Credits			
			L	T	P	C
Theory						
1	U24EN101	Technical English	3	0	0	3
2	U24MA101	Matrices and Differential Calculus	3	1	0	4
3	U24CH151	Engineering Chemistry	3	0	0	3
4	U24GE101	Principles of Engineering	3	0	0	3
5	U24GE152	Engineering Graphics	2	1	0	3
6	U24EM101	Coding Techniques	3	0	0	3
Practical						
7	U24MA102	Mathematics Laboratory	0	0	2	1
8	U24CH152	Engineering Chemistry Laboratory	0	0	2	1
9	U24EM102	Coding Techniques Laboratory	0	0	2	1
Total			17	2	6	22

SEMESTER II

Sl.No.	Course Code	Course Name	Credits			
			L	T	P	C
Theory						
1	U24EN151	Technical Communication Skill Development	2	0	2	3
2	U24MA151	Vector Calculus and Laplace Transforms	3	1	0	4
3	U24PH101	Engineering Physics	3	0	0	3
4	U24GE151	Design Thinking	3	0	0	3
5	U24GE102	Biology for Engineers	3	0	0	3
6	U24EM151	Programming in Practice	3	0	0	3
Practical						
7	U24PH102	Engineering Physics Laboratory	0	0	2	1
8	U24GE153	Design Thinking Laboratory	0	0	4	2
9	U24GE154	Engineering Practices	0	0	2	1
10	U24EM152	Programming in Practice Laboratory	0	0	2	1
Total			17	1	12	24

SEMESTER III

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
Theory						
1	U24MA201	Multivariate Calculus and Linear Algebra	3	1	0	4
2	U24SH201	Universal Human Values	2	1	0	3
3	U24GE202	Biochemistry	3	0	0	3
4	U24GE203	Genetics	3	0	0	3
5	U24BT201	Microbiology	3	0	0	3
6	U24BT202	Basic Transport Processes	3	0	0	3
Practical						
7	U24GE204	Biochemistry Laboratory	0	0	2	1
8	U24BT203	Microbiology Laboratory	0	0	2	1
9	U24BT204	Basic Transport Processes Laboratory	0	0	2	1
Audit Course						
10	U24AUXXX	Audit Course – I	--	--	--	--
Total			17	2	6	22

SEMESTER IV

Sl.No.	Course Code	Course Name	Credits			
			L	T	P	C
Theory						
1	U24MA253	Statistics and Numerical Methods	3	1	0	4
2	U24BT251	Cellular and Molecular Biology	3	0	0	3
3	U24BT252	Bioenergetics and Metabolism	3	0	0	3
4	U24BT253	Bioanalytical Techniques	3	0	0	3
5	U24BT254	Chemical Engineering Thermodynamics	3	1	0	4
6	U24BT751	Ancient Indian Medicinal System	3	0	0	3
Practical						
7	U24BT255	Bioanalytical Techniques Laboratory	0	0	2	1
8	U24BT256	Cellular and Molecular Biology Laboratory	0	0	4	2
9	U24EM2XX	Internship/ Practical Training/ Value Added Course(s)	2	0	2	3
Audit Course						
10	U24AUXXX	Audit Course – II	--	--	--	--
Total			20	2	8	26

SEMESTER V

Sl.No.	Course Code	Course Name	Credits			
			L	T	P	C
Theory						
1	U24BT301	Immunology	3	0	0	3
2	U24BT302	Bioreaction Engineering	3	0	0	3
3	U24BT303	Upstream Processing Techniques	3	0	0	3
4	U24BT7XX	Open Elective – I	3	0	0	3
5	U24BT9XX	Professional Elective - I	3	0	0	3
6	U24BT9XX	Professional Elective - II	3	0	0	3
7	U24EM301	Community Engagement and Social Responsibility	1	0	2	2
Practical						
8	U24BT304	Immunology Laboratory	0	0	4	2
9	U24BT305	Bioreaction Engineering Laboratory	0	0	4	2
Audit Course						
10	U24AUXXX	Audit Course – III	--	--	--	--
Total			19	0	10	24

SEMESTER VI

Sl.No.	Course Code	Course Name	Credits			
			L	T	P	C
Theory						
1	U24GE351	Microbial Biotechnology	2	0	0	2
2	U24BT351	Plant Biotechnology and Animal Biotechnology	4	0	0	4
3	U24BT352	Tissue Engineering	3	0	0	3
4	U24BT7XX	Open Elective – II	3	0	0	3
5	U24BT8XX	Online Course – I	3	0	0	3
6	U24BT9XX	Professional Elective - III	3	0	0	3
7	U24BT9XX	Professional Elective - IV	3	0	0	3
Practical						
8	U24BT353	Upstream Processing Techniques Laboratory	0	0	4	2
9	U24EM3XX	Skill Enhancement / Value Added Course(s)	1	0	2	2
Audit Course						
10	U24AUXXX	Audit Course – IV	--	--	--	--
Total			22	0	6	25

SEMESTER VII

Sl.No.	Course Code	Course Name	Credits			
			L	T	P	C
Theory						
1	U24GE401	Professional Ethics	3	0	0	3
2	U24BT401	Downstream Processing Techniques	3	0	0	3
3	U24BT402	Recombinant DNA Technology	3	0	0	3
4	U24BT403	Computational Biology	3	0	0	3
5	U24BT9XX	Professional Elective - V	3	0	0	3
6	U24BT9XX	Professional Elective - VI	3	0	0	3
Practical						
7	U24BT404	Recombinant DNA Technology Laboratory	0	0	4	2
8	U24BT405	Downstream Processing Techniques Laboratory	0	0	2	1
9	U24BT406	Computational Biology Laboratory	0	0	2	1
10	U24EM401	Project Phase – I	0	0	8	4
Total			18	0	16	26

SEMESTER VIII

Sl.No.	Course Code	Course Name	Credits			
			L	T	P	C
Theory						
1	U24BT8XX	Online Course – II	3	0	0	3
Practical						
2	U24EM451	Project Phase – II	0	0	16	8
Total			3	0	16	11

The number of credits in each semester is summarized as follows:

Course	I	II	III	IV	V	VI	VII	VIII
B.Tech. Biotechnology with Specialization in Data Analytics for Biotechnology	22	24	22	26	24	25	26	11

Semester wise Credit Distribution (in all categories of courses)

Sl. No.	Category of Courses	Credits	I	II	III	IV	V	VI	VII	VIII
1.	Foundation Courses	61	18	20	14	4	-	2	3	-
2.	Professional Core Courses	59	-	-	8	16	13	9	13	-
3.	Professional Elective Courses	18	-	-	-	-	6	6	6	-
4.	Open Elective Courses and Indian Knowledge System	9	-	-	-	3	3	3	-	-
5.	Employability Enhancement Courses	27	4	4	-	3	2	2	4	8
6.	Online Courses	6	-	-	-	-	-	3	-	3
7.	Audit Courses	-	-	-	-	-	-	-	-	-
Total		200	22	24	22	26	24	25	26	11

Suggested List of Professional Elective Courses

Professional Elective - I

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT901	Bioprocess Control and Instrumentation	3	0	0	3
2	U24BT902	Heat and Mass Transfer Fundamentals	3	0	0	3
3	U24BT903	Transport Phenomena in Biological System	3	0	0	3
4	U24BT904	Bioreactor Design and Scale up Process	3	0	0	3
5	U24BT905	Applied Chemical Reaction Engineering	3	0	0	3

Professional Elective – II

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT906	Pharmaceutical Biotechnology	3	0	0	3
2	U24BT907	Protein Engineering	3	0	0	3
3	U24BT908	Bionanotechnology	3	0	0	3
4	U24BT909	Biomedical Engineering	3	0	0	3
5	U24BT910	Biosafety and Hazard Management	3	0	0	3

Professional Elective - III

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT951	Therapeutic Application of Phytochemicals	3	0	0	3
2	U24BT952	Biotechnological Approach in Crop Improvement	3	0	0	3
3	U24BT953	Plant Tissue Culture and Transformation Techniques	3	0	0	3
4	U24BT954	Animal Cell Culture Technology	3	0	0	3
5	U24BT955	Agricultural Biotechnology	3	0	0	3

Professional Elective - IV

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT956	Enzyme Technology	3	0	0	3
2	U24BT957	Bio-fertilizer Production and Mushroom Cultivation	3	0	0	3
3	U24BT958	Bioenergy and Biofuels	3	0	0	3
4	U24BT959	Clinical Trials and Health Care Policies in Biotechnology	3	0	0	3
5	U24BT960	Food Biotechnology	3	0	0	3

Professional Elective – V

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT911	Cancer Biology	3	0	0	3
2	U24BT912	Environmental Biotechnology	3	0	0	3
3	U24BT913	Biomaterials	3	0	0	3
4	U24BT914	Stem Cell Technology	3	0	0	3
5	U24BT915	Bioreactor Consideration for Recombinant Products	3	0	0	3

Professional Elective – VI

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT916	Intellectual Property Rights in Biotechnology	3	0	0	3
2	U24BT917	Molecular Therapeutics and Diagnostics	3	0	0	3
3	U24BT918	Biophysics	3	0	0	3
4	U24BT919	Tissue Regeneration	3	0	0	3
5	U24BT920	Rheology for Complex Fluids	3	0	0	3

List of Courses under each Category

Foundation Courses

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
Humanities & Social Sciences including Management Courses						
1	U24EN101	Technical English	3	0	0	3
2	U24EN151	Technical Communication Skill Development	2	0	2	3
3	U24SH201	Universal Human Values	2	1	0	3
Basic Science Courses						
4	U24MA101	Matrices and Differential Calculus	3	1	0	4
5	U24PH101	Engineering Physics	3	0	0	3
6	U24MA102	Mathematics Laboratory	0	0	2	1
7	U24PH102	Engineering Physics Laboratory	0	0	2	1
8	U24MA151	Vector Calculus and Laplace Transforms	3	1	0	4
9	U24CH151	Engineering Chemistry	3	0	0	3
10	U24CH152	Engineering Chemistry Laboratory	0	0	2	1
11	U24MA201	Multivariate Calculus and Linear Algebra	3	1	0	4
12	U24MA253	Statistics and Numerical Methods	3	1	0	4
Engineering Science Courses						
13	U24GE101	Principles of Engineering	3	0	0	3

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
14	U24GE102	Biology for Engineers	3	0	0	3
15	U24GE151	Design Thinking	3	0	0	3
16	U24GE152	Engineering Graphics	2	1	0	3
17	U24GE153	Design Thinking Laboratory	0	0	4	2
18	U24GE154	Engineering Practices	0	0	2	1
19	U24GE202	Biochemistry	3	0	0	3
20	U24GE203	Genetics	3	0	0	3
21	U24GE204	Biochemistry Laboratory	0	0	2	1
22	U24GE351	Microbial Biotechnology	2	0	0	2
23	U24GE401	Professional Ethics	3	0	0	3
Total			47	6	16	61

Professional Core Courses

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1.	U24BT201	Microbiology	3	0	0	3
2.	U24BT202	Basic Transport Processes	3	0	0	3

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
3.	U24BT203	Microbiology Laboratory	0	0	2	1
4.	U24BT204	Basic Transport Processes Laboratory	0	0	2	1
5.	U24BT251	Cellular and Molecular Biology	3	0	0	3
6.	U24BT252	Bioenergetics and Metabolism	3	0	0	3
7.	U24BT253	Bioanalytical Techniques	3	0	0	3
8.	U24BT254	Chemical Engineering Thermodynamics	3	1	0	4
9.	U24BT255	Bioanalytical Techniques Laboratory	0	0	2	1
10.	U24BT256	Cellular and Molecular Biology Laboratory	0	0	4	2
11.	U24BT301	Immunology	3	0	0	3
12.	U24BT302	Bioreaction Engineering	3	0	0	3
13.	U24BT303	Upstream Processing Techniques	3	0	0	3
14.	U24BT304	Immunology Laboratory	0	0	4	2
15.	U24BT305	Bioreaction Engineering Laboratory	0	0	4	2
16.	U24BT351	Plant Biotechnology and Animal Biotechnology	4	0	0	4
17.	U24BT352	Tissue Engineering	3	0	0	3
18.	U24BT353	Upstream Processing Techniques Laboratory	0	0	4	2
19.	U24BT401	Downstream Processing Techniques	3	0	0	3

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
20.	U24BT402	Recombinant DNA Technology	3	0	0	3
21.	U24BT403	Computational Biology	3	0	0	3
22.	U24BT404	Recombinant DNA Technology Laboratory	0	0	4	2
23.	U24BT405	Downstream Processing Techniques Laboratory	0	0	2	1
24.	U24BT406	Computational Biology Laboratory	0	0	2	1
Total			43	1	30	59

Professional Elective Courses

Sl.No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT9XX	Professional Elective - I	3	0	0	3
2	U24BT9XX	Professional Elective - II	3	0	0	3
3	U24BT9XX	Professional Elective - III	3	0	0	3
4	U24BT9XX	Professional Elective - IV	3	0	0	3
5	U24BT9XX	Professional Elective - V	3	0	0	3
6	U24BT9XX	Professional Elective - VI	3	0	0	3
Total			18	0	0	18

Open Elective Courses and IKS

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT751	IKS- Ancient Indian Medicinal System	3	0	0	3
2	U24BT7XX	Open Elective - I	3	0	0	3
3	U24BT7XX	Open Elective - II	3	0	0	3
Total			9	0	0	9

List of Open Elective Courses

Sl.No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT7XX	Intellectual Property Rights	3	0	0	3
2	U24BT7XX	Industrial Safety and Risk Management	3	0	0	3
3	U24BT7XX	Biostatistics	3	0	0	3
4	U24BT7XX	Introduction to Food and Nutrition	3	0	0	3

Employability Enhancement Courses

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24EM101	Coding Techniques	3	0	0	3
2	U24EM102	Coding Techniques Laboratory	0	0	2	1
3	U24EM151	Programming in Practice	3	0	0	3
4	U24EM152	Programming in Practice Laboratory	0	0	2	1
5	U24EM2XX	Internship/ Practical Training/Value Added Course(s)	2	0	2	3
6	U24EM301	Community Engagement and Social Responsibility	1	0	2	2
7	U24EM3XX	Skill Enhancement/Value Added Course(s)	1	0	2	2
8	U24EM401	Project Phase - I	0	0	8	4
9	U24EM451	Project Phase - II	0	0	16	8
Total			10	0	34	27

Online Courses

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24BT8XX	Online Course - I	3	0	0	3
2	U24BT8XX	Online Course - II	3	0	0	3
Total			6	0	0	6

Audit Courses

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24AUXXX	Audit Course - I	2	0	0	0
2	U24AUXXX	Audit Course - II	2	0	0	0
3	U24AUXXX	Audit Course - III	2	0	0	0
4	U24AUXXX	Audit Course - IV	2	0	0	0
Total			8	0	0	0

Suggested list of Audit Courses

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24AU001	Disaster Management	-	-	-	-
2	U24AU003	Cyber Security	-	-	-	-
3	U24AU007	Environmental Studies	-	-	-	-
4	U24AU008	Entrepreneurship Development	-	-	-	-
5	U24AU009	Constitution of India	-	-	-	-

List of Courses on Technology Readiness (Optional)

Sl. No.	Course Code	Course Name	Credits			
			L	T	P	C
1	U24TR001	AI Ethics & Bias	3	0	0	3
2	U24TR002	Value Added Course – AI Based Education	1	0	0	1
3	U24TR003	AI Agents and Intelligent Systems	3	0	0	3
4	U24TR004	Skill Development Programme – Development of Custom Large Language Models	0	0	2	1
5	U24TR005	Explainable AI	3	0	0	3
6	U24TR006	Transformers and Attention Mechanisms	3	0	0	3
7	U24TR007	Large Language Models	3	0	0	3
8	U24TR008	Multimodal AI	3	0	0	3
Total			19	0	2	20

Students may opt for any technology readiness course based on their interests or career goals. These courses can be delivered through flipped classrooms, online platforms, or industry-led sessions. Each course is designed to target specific employability and research skills. Students should be encouraged to implement multimodal or generative AI in real-life applications.

Course Title	Suggested Prerequisites
AI Ethics & Bias	Introduction to Artificial Intelligence, Data Science

	Fundamentals
AI Agents and Intelligent Systems	Python Programming, Discrete Mathematics, Introduction to Artificial Intelligence
Explainable AI	Machine Learning, Probability, Linear Algebra
Transformers and Attention Mechanisms	Neural Networks, Deep Learning, Machine Learning
Large Language Models	Natural Language Processing, Transformers, Deep Learning
Multimodal AI	Natural Language Processing, Computer Vision, Machine Learning, Audio Processing Basics