



**PERIYAR
MANIAMMAI**
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University)
Established Under Sec.-3 of UGC Act, 1956 • NAAC Accredited
think • innovate • transform

Criterion 1 – Curricular Aspects

Key Indicator	1.2	Academic Flexibility
Metric	1.2.2	Percentage of Programmes in which Choice Based Credit System (CBCS)/elective course system has been implemented (Data for the latest completed academic year)

DEPARTMENT OF BIOTECHNOLOGY

STRUCTURE OF THE PROGRAM CLEARLY INDICATING COURSES, CREDITS/ELECTIVES

PROGRAMMES

1. **B.Tech Biotechnology**
2. **M.Sc Biotechnology**
3. **M.Tech Nanotechnology**

1. B.Tech Biotechnology

REGULATION 2021 - B.Tech Biotechnology

REGULATIONS – 2021 Revision -II (Applicable to the students admitted from the Academic year 2023-24)

Semester I

S.No.	Course Code	Courses	Credits				Hours			
			L	T	P	C	L	T	P	Total
1.	XMA101	Calculus and Linear Algebra	3	1	0	4	3	1	0	4
2.	XCP102	Programming for Problem Solving	3	0	0	3	3	0	0	3
3.	XAP103	Applied Physics for Engineers	3	1	0	4	3	1	0	4
4.	XBT104	Biology for Engineers	3	0	0	3	3	0	0	3
5	XGS105	Speech Communication	0	0	3	3	0	0	3	3
6	XUM106	Constitution of India	0	0	0	0	2	0	0	2
7	XCP107	Programming for Problem Solving Laboratory	0	0	1	1	0	0	3	3
8	XAP108	Applied Physics for Engineers Laboratory	0	0	2	2	0	0	3	3
		Total	12	2	6	20	14	2	9	25

Semester II

S.No.	Course Code	Courses	Credits				Hours			
			L	T	P	C	L	T	P	Total
1.	XMA201	Calculus, Ordinary Differential Equations and Complex Variable	3	1	0	4	3	1	0	4
2.	XBE202	Electrical and Electronic Engineering Systems	3	1	0	4	3	1	0	4
3.	XAC203	Applied Chemistry for Engineers	3	1	0	4	3	1	0	4
4	XGS204	Technical Communication	2	0	0	2	2	0	0	2
5	XWP205	Workshop Practices	1	0	2	3	1	0	3	4
6	XBT206	Chemical Engineering Thermodynamics	2	1	0	3	2	1	0	3
7	XBE207	Electrical and Electronic Engineering Systems Laboratory	0	0	1	1	0	0	3	3
8	XAC208	Applied Chemistry for Engineers Laboratory	0	0	1	1	0	0	3	3
		Total	14	4	4	22	14	4	9	27

Semester III

S.No.	Course Code	Courses	Credits				Hour			
			L	T	P	C	L	T	P	Total
1.	XPS301	Probability and statistics	3	0	0	3	3	0	0	3
2.	XBT302	Biochemistry	2	1	0	3	3	1	0	4
3.	XBT303	Microbiology	3	0	0	3	3	0	0	3
4.	XBT304	Material and Energy Balances	2	1	0	3	2	1	0	3
5.	XBT305	Genetics and Evolutionary Biology	3	0	0	3	3	0	0	3
6.	XUM306	Entrepreneurship Development	2	0	0	2	2	0	0	2
7	XUM307	Universal Human Values 2: Understanding Harmony	2	1	0	3	2	1	0	3
8	XBT308	Biochemistry Laboratory	0	0	2	2	0	0	6	6
9	XBT309	Microbiology Laboratory	0	0	2	2	0	0	6	6
10	XBT310	In-plant Training - I	-	-	-	1	-	-	-	-
		Total	17	3	4	25	18	3	12	33

Semester IV

S.No.	Code	Courses	Credits				Hours			
			L	T	P	C	L	T	P	Total
1.	XBT401	Basic Transport Processes	2	1	0	3	2	1	0	3
2.	XBT402	Bioenergetics and Metabolism	2	1	0	3	2	1	0	3
3.	XBT403	Cell Biology	3	0	0	3	3	0	0	3
4.	XBT404	Immunology	3	0	0	3	3	0	0	3
5.	XUM405	Economics for Engineers	3	0	0	3	3	0	0	3
6	XUM406	Disaster Management	0	0	0	0	2	0	0	2
7	XBT407	Basic Transport Processes Laboratory	0	0	1	1	0	0	4	4
8	XBT408	Cell Biology Laboratory	0	0	2	2	0	0	8	8
9	XBT409	Immunology Laboratory	0	0	1	1	0	0	4	4
		Total	13	2	4	19	15	2	16	33

Semester V

S.No.	Code	Courses	Credits				Hours			
			L	T	P	C	L	T	P	Total
1	XBT501	Bioanalytical Tools	3	0	0	3	3	0	0	3
2	XBT502	Molecular Biology	3	0	0	3	3	0	0	3
3	XBT503	Bioreaction Engineering	2	1	0	3	3	1	0	4
4	XBT504	Plant Biotechnology	3	0	0	3	3	0	0	3
5	XBT505A	A. Food Biotechnology	3	0	0	3	3	0	0	3
	XBT505B	B. Agricultural Biotechnology								
	XBT505C	C. Pharmaceutical Biotechnology								
	XBT505D	D. Bioprocess Control and Instrumentation								
	XBT505E	E. Tissue Engineering								
	XBT505F	F. Human Genetics								
6	XOE1	Open Elective Courses	3	0	0	3	3	0	0	3
7	XBT507	Bioanalytical Tools Laboratory	0	0	2	2	0	0	6	6
8	XBT508	Bioreaction Engineering Laboratory	0	0	2	2	0	0	6	6
9	XBT509	In-plant Training - II	-	-	-	1	-	-	-	-
10	XBTMO1	Minor Course I*#	0	0	1	0	0	0	1	3
		Total	17	1	5	23	18	1	13	34

Semester VI

S.No.	Course Code	Courses	Credits				Hours			
			L	T	P	C	L	T	P	Total
1	XBT601	Animal Biotechnology	3	0	0	3	3	0	0	3
2	XBT602	Process Biotechnology – Upstream Processes	2	1	0	3	3	1	0	4
3	XBT603	Process Biotechnology – Downstream Processes	2	1	0	3	3	1	0	4
3	XBT604A	A. Mass Transfer Fundamentals	3	0	0	3	3	0	0	3
	XBT604B	B. Fermentation Technology								
	XBT604C	C. Nanobiotechnology								
	XBT604D	D. Bioreactor Design and Scale up Process								
	XBT604E	E. Biomaterials								
	XBT604F	F. Fundamentals of Algorithms for Bioinformatics								
4	XOE2	Open Elective Courses	3	0	0	3	3	0	0	3
5	XGS605	English Language Skills	1	0	2	3	1	0	3	4
6	XUM606	Cyber Security*#	0	0	0	0	3	0	0	3
7	XBT607	Process Biotechnology Laboratory	0	0	2	2	0	0	6	6
8	XBTMO2	Minor Course II*#	0	0	1	0	0	0	1	3
		Total	14	2	5	20	19	2	10	33

Semester VII

SNo.	Course Code	Courses	Credits				Hours			
			L	T	P	T	L	T	P	Total
1	XBT701	Microbial Biotechnology	3	0	0	3	3	0	0	3
2	XBT702	Recombinant DNA Technology	3	0	0	3	3	0	0	3
3	XBT703A	A. Stem Cell Biotechnology	2	1	0	3	3	0	0	3
	XBT703B	B. Cancer Biology								
	XBT703C	C. Design of Bioprocess Equipment								
	XBT703D	D. Molecular Therapeutics and Diagnostics								
	XBT703E	E. Transport Phenomena in Biological System								
	XBT703F	F. Biosafety and Hazard Management								
4	XOE3	Open Elective Courses	3	0	0	3	3	0	0	3
5	XES705	Environmental studies*#	0	0	0	0	3	0	0	3
6	XBT706	Recombinant DNA Technology Laboratory	0	0	2	2	0	0	6	6
7	XBT707	Bioinformatics	1	0	1	2	1	0	5	5
8	XBT708	Project Work (Phase-I)	0	0	2	2	0	0	4	4
9.	XBT709	In-plant Training – III	-	-	-	2	-	-	-	-
10	XBTMO3	Minor Course III*#	0	0	1	0	0	0	1	3
		Total	12	1	7	20	16	0	16	33

Semester VIII

S.No.	Course Code	Courses	Credits				Hours			
			L	T	P	Total	L	T	P	Total
1	XBT801A	A. Introduction to Quantum Biology, AI and Data Science								
	XBT801B	B. Enzyme Engineering								
	XBT801C	C. Biowaste and Biproducts Utilization								
	XBT801D	D.Molecular Modelling	2	1	0	3	2	1	0	3
	XBT801E	E. Clinical Trials and Healthcare Policies in Biotechnology								
	XBT801F	F.Biotechnological Approach in Crop Improvement								
2	XOE4	Open Elective Courses	3	0	0	3	3	0	0	3
3	XOE5	Open Elective Courses	3	0	0	3	3	0	0	3
4	XBT804	Project Work (Phase-II)	0	0	9	9	0	0	18	18
5	XBTMO4	Minor Course IV*#	0	0	1	0	0	0	1	3
		Total	8	1	1	18	8	1	19	30

2. MS.c Biotechnology

REGULATION 2023 – MS.c Biotechnology

REGULATIONS – 2023 (Applicable to the students admitted from the Academic year 2023-24)
Semester-I

S.No.	Course Code	Courses	Credits				Hours			
			L	T	P	C	L	T	P	Total
1.	YBT 101	Cell Biology and Molecular Biology	4	0	0	4	4	0	0	4
2.	YBT 102	Biochemistry	4	0	0	4	4	0	0	4
3.	YBT 103	Microbiology	4	0	0	4	4	0	0	4
4.	YBT 104*	A. Bioanalytical Technique								
		B. Nanobiotechnology	3	0	0	3	3	0	0	3
		C. Molecular Genetics								
5	YBT 105	Molecular Biology and Microbiology Laboratory	0	0	3	3	0	0	6	6
6	YBT 106	Biochemistry Laboratory	0	0	3	3	0	0	6	6
7	YBT 107	Communication Skills and Scientific Writing	0	0	1	1	0	0	2	2
		Total	15	0	7	22	15	0	15	30

Semester-II

Sl.no	Course Code	Name of the course	Credits				Hours			
			L	T	P	C	L	T	P	Total
1.	YBT201	Recombinant DNA Technology	4	0	0	4	4	0	0	4
2.	YBT202	Immunology	4	0	0	4	4	0	0	4
3.	YBT203	Biostatistics	4	0	0	4	4	0	0	4
4.	YBT204*	A. Stem Cell Biology and Tissue Engineering	3	0	0	3	3	0	0	3
5.		B. Animal and Plant Biotechnology								
6.		C. Pharmaceutical Biotechnology								
7.	YBT205	Immunology lab	0	0	3	3	0	0	4	4
8.	YBT206	Recombinant DNA Technology Lab	0	0	3	3	0	0	6	6
9.	YBT207	Research Methodology, Ethics, and IPR	3	0	0	3	2	0	0	2
10.	OE	Open Elective	3	0	0	3	3	0	0	3
		Total	21	0	6	27	20	0	10	30

Semester-III

Sl.No	Course Code	Name of the course	Credits				Hours			
			L	T	P	C	L	T	P	Total
1.	YBT 301	Enzymology	4	0	0	4	4	0	0	4
2.	YBT 302	Bioprocess Technology	4	0	0	4	4	0	0	4
3.	YBT 303	Computational Biology	4	0	0	4	4	0	0	4
4.	YBT 304*	A. Medical Biotechnology and Drug Design	3	0	0	3	3	0	0	3
5.		B. Agricultural Biotechnology								
6.		C. Food Processing Techniques								
7.	YBT 305*	A. Microbial Biotechnology	3	0	0	3	3	0	0	3
8.		B. Environmental Biotechnology								
9.		C. Regulatory affairs and Industrial standards								
10.	YBT 306	Bioprocess Technology Laboratory	0	0	3	3	0	0	4	4
11.	YBT 307	Computational Biology Laboratory	0	0	3	3	0	0	4	4
12.	YBT 308	Entrepreneurship	2	0	0	2	2	0	0	2
13.	YBT 309	Project Phase I	0	0	2	2	0	0	10	10
		Total	20	0	8	28	20	0	18	38

Semester-IV

S.No	Course Code	Name of the course	Credits				Hours			
			L	T	P	C	L	T	P	Total
1.	YBT 401	Project Phase II	0	0	14	14	0	0	30	30
		Total	0	0	14	14	0	0	30	30

3. M.Tech Nanotechnology

REGULATION 2023 – M.Tech Nanotechnology

REGULATIONS – 2023 (Applicable to the students admitted from the Academic year 2023-24)

SEMESTER I

S.No	Course Code	Course Title	Credits				Hours				
			L	T	P	C	L	T	P	S.S	Total
1	YNT101	Introduction to Nanotechnology	3	0	0	3	3	0	0	0	3
2	YNT102	Nanomaterials Fabrication Techniques	3	0	0	3	3	0	0	0	3
3	YNT103	Materials Science & Engineering	3	0	0	3	3	0	0	0	3
4	YNT104*	A. Societal Implications of Nanotechnology	3	0	0	3	3	0	0	1	4
		B.Nanochemistry									
		C.Nanomedicine									
		D.Nanotechnology in Energy Conversion and Storage									
		E.Nanofluid Dynamics									
		F.Cell and Molecular Biology									
5	YNT105*	A.Nanoscale Magnetic Materials and Devices	3	0	0	3	3	0	0	1	4
		B.Metallopolymer Nanocomposites									
		C.Properties of Nanophase Materials									
		D.Nanotoxicology									
		E.3D Printing									
		F.Green Manufacturing Technology									
6	YNT106	Simulation of Nanostructure & Nanomaterials Lab	0	0	2	2	0	0	4	0	4
7	YRM107	Research Methodology and IPR	2	0	0	2	3	0	0	0	3
8	YNT107	Nanomaterials Fabrication Techniques	0	0	2	2	0	0	4	0	4
9.	YEGOE1	English for Research Paper Writing	0	0	0	0	2	0	0	0	2
Total			17	0	4	21	20	0	8	2	30

SEMESTER II

S.No	Course Code	Course Title	Credits				Hours				
			L	T	P	C	L	T	P	S.S	Total
1	YNT201	Nanomaterials Characterization Techniques	3	0	0	3	3	0	0	1	4
2	YNT202	Computational Nanotechnology	3	0	0	3	3	0	0	1	4
3	YNT203	Nano composites	3	0	0	3	3	0	0	1	4
4	YNT204*	A.Polymer Engineering									
		B.Advanced Crystal Growth Techniques									
		C. Carbon Nanotube Electronics and Devices	3	0	0	3	3	0	0	1	4
		D.Nanoscale Integrated Computing									
		E.Thin Film Science and Technology									
		F.Micro and Nano Emulsions									
5	YNT205*	A.Micro/Nano Devices and Sensors									
		B.Graphene Nanotechnology									
		C.Carbon Nanotube	3	0	0	3	3	0	0	0	3
		D.Quantum Dot									
		E.Polymeric Carrier									
		F.Lithographic Techniques									
6	YNT206	Nanomaterials Characterization Techniques Lab	0	0	2	2	0	0	4	0	4
7	YNT207	Computational Nanotechnology Lab	0	0	2	2	0	0	4	0	4
8	YNT208	Mini Project	0	0	1	1	0	0	4	0	4
9	YPSOE1	Constitution of India	0	0	0	0	2	0	0	0	2
		Total	15	0	5	20	17	0	12	3	32

SEMESTER III

S.No	Course Code	Course Title	Credits				Hours				
			L	T	P	C	L	T	P	S.S	Total
1	YNT301*	A. Nanotechnology Business Applications and Commercialization									
		B.Nano – CMOS Circuit and Physical Design									
		C.Nanomaniplulation & Assembly	3	0	0	3	3	0	0	0	3
		D.Nanophotonics for Biotechnology and Nanomedicine									
		E.Nano-Spintronics									
		F.Nanomaterials and photocatalytic nanoparticles for water/air detoxification									
2	OE	Open Elective	3	0	0	3	3	0	0	0	3
3	YNT303	Dissertation Phase - I	0	0	10	10	0	0	20	0	20
		Total	6	0	10	16	6	0	20	0	26

SEMESTER IV

S.No	Course code	Course Title	Credits				Hours				
			L	T	P	C	L	T	P	S.S	Total
1	YNT401	Dissertation Phase - II	0	0	0	16	0	0	32	0	32
		Total	0	0	0	16	0	0	32	0	32