

ACADEMIC CURRICULA
UNDERGRADUATE/ INTEGRATED
POST GRADUATE DEGREE
PROGRAMMES

(With exit option of Diploma)

(Choice Based Flexible Credit System)

Regulations 2021

Volume – 1

(Revised on July 2024)



SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University u/s 3 of UGC Act, 1956)

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(Deemed to be University u/s 3 of UGC Act, 1956)

Kattankulathur, Chengalpattu District 603203,

Tamil Nadu, India

10. B.Tech. in Biotechnology with Specialization in Regenerative Medicine

10. (a) Mission of the Department

Mission Stmt – 1	<i>To adopt effective teaching methods to improve the learning process and impart knowledge of biology and technology.</i>
Mission Stmt – 2	<i>To provide hands-on training and technical skills to transform students into technocrats and facilitate research and higher education in the fields of biotechnology.</i>
Mission Stmt – 3	<i>To pursue and promote cutting-edge research in selected fields of biotechnology</i>

10. (b) Program Educational Objectives (PEO)

PEO – 1	<i>To develop graduates with enhanced technical and professional skills in Tissue Engineering</i>
PEO – 2	<i>To develop the ability amongst the students to apply modern bioengineering techniques in solve complex engineering solutions in Regenerative Medicine</i>
PEO – 3	<i>To prepare students to demonstrate the applications of biotechnological principles through research related to regeneration and transplants for societal and industrial importance</i>

10. (c) Mission of the Department to Program Educational Objectives (PEO) Mapping

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3
PEO - 1	3	3	3
PEO - 2	3	3	3
PEO - 3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

10. (d) Mapping Program Educational Objectives (PEO) to Program Outcomes (PO)

	Program Outcomes (PO)												Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2	PSO-3
	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning			
PEO - 1	3	3	2	3	2	2	2	2	3	2	2	2	3	3	3
PEO - 2	3	3	3	3	3	2	2	2	2	2	3	3	3	3	3
PEO - 3	3	3	3	3	3	2	2	2	3	2	3	3	3	3	3

3 – High Correlation, 2 – Medium Correlation, 1 – Low Correlation

PSO – Program Specific Outcomes (PSO)

PSO - 1	<i>Integrate engineering principles for pursuing excellence in applied fields of Tissue Engineering</i>
PSO - 2	<i>Acquire knowledge and problem-solving skills in tissue engineering and stem cell research, critical in sustaining life processes for better health.</i>
PSO - 3	<i>Ability to apply biological knowledge from the perspective of engineers for development of industrial products in tissue regeneration</i>

10. (e) Program Structure: B.Tech. in Biotechnology with Specialization in Regenerative Medicine

Humanities & Social Sciences including Management Courses (H)						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21LEH101T	Communicative English	2	1	0	3	
21LEH102T	Chinese	2	1	0	3	
21LEH103T	French					
21LEH104T	German					
21LEH105T	Japanese					
21LEH106T	Korean					
21LEH107T	Spanish					
21LEH108T	Russian					
21GNH101J	Philosophy of Engineering	1	0	2	2	
21PDH209T ¹	Social Engineering	2	0	0	2	
21GNH401T	Behavioral Psychology	2	1	0	3	
Total Credits 13						
Engineering Science Courses (S)						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21CSS101J	Programming for Problem Solving	3	0	2	4	
21MES101L ¹	Basic Civil and Mechanical Workshop	0	0	4	2	
21MES102L ¹	Engineering Graphics and Design	0	0	4	2	
21EES101T	Electrical and Electronics Engineering	3	1	0	4	
21DCS201P ¹	Design Thinking and Methodology	1	2	0	3	
21CHS251T	Basic Chemical Engineering	3	0	0	3	
21CHS252J	Chemical Engineering Principles	3	0	2	4	
21CSS303T	Data Science	1	1	0	2	
Total Credits 24						
Non Credit Courses (M)						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21PDM101L ¹	Professional Skills and Practices	0	0	2	0	
21PDM102L ¹	General Aptitude	0	0	2		
21PDM201L ¹	Verbal Reasoning	0	0	2		
21PDM202L ¹	Critical and Creative Thinking Skills	0	0	2		
21PDM301L ¹	Analytical and logical Thinking Skills	0	0	2		
21PDM302L ¹	Employability Skill and Practices	0	0	2		
21CYM101T ¹	Environmental Science	1	0	0		0
21LEM101T ¹	Constitution of India	1	0	0	0	
21LEM102T ¹	Universal Human Values – Introduction	1	0	0	0	
21LEM201T ¹	Professional Ethics	1	0	0	0	
21LEM202T ¹	Universal Human Values-II: Understanding Harmony and Ethical Human Conduct	2	1	0	3	
21LEM301T ¹	Indian Art Form	1	0	0	0	
21LEM302T ¹	Indian Traditional Knowledge	1	0	0	0	
21BTM191T ¹	Bioethics and IPR	1	0	0	0	
21GNM101L ¹	Physical and Mental health using Yoga	0	0	2	0	
21GNM102L ¹	National Service Scheme					
21GNM103L ¹	National Cadet Corps					
21GNM104L ¹	National Sports Organization					
Total Credits 03						

Basic Science Courses (B)					
Course Code	Course Title	Hours / Week			
		L	T	P	C
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
21CYB101J	Chemistry	3	1	2	5
21MAB101T	Calculus and Linear Algebra	3	1	0	4
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21MAB303T	Biostatistics for Biotechnologists	3	1	0	4
21BTB105T	Cell Biology	2	0	0	2
Total Credits 24					
Professional Core Courses (C)					
Course Code	Course Title	Hours / Week			
		L	T	P	C
21BTC101T	Biochemistry	3	0	0	3
21BTC201L ¹	Biochemistry Laboratory	0	0	4	2
21BTC202T	Microbiology	3	0	0	3
21BTC203L ¹	Cell and Microbiology Laboratory	0	0	4	2
21BTC204T	Bioprocess Principles	3	0	0	3
21BTC205L ¹	Bioprocess Principles Laboratory	0	0	4	2
21BTC206T	Genetics and Cytogenetics	3	0	0	3
21BTC207T	Molecular Biology	3	0	0	3
21BTC208L ¹	Molecular Biology Laboratory	0	0	4	2
21BTC209T ²	Bioprocess Engineering	3	0	0	3
21BTC210L ¹	Bioprocess Engineering Laboratory	0	0	4	2
21CSC206T	Artificial Intelligence	3	0	0	3
21BTC301J	Gene Manipulation and Genomics	3	0	2	4
21BTC302J	Immunology	3	0	2	4
21BTC303T	Protein Engineering	3	0	0	3
21BTC304T	Animal Biotechnology	3	0	0	3
21BTC305L ¹	Animal Biotechnology Laboratory	0	0	4	2
21BTC306T	Plant Biotechnology	3	0	0	3
21BTC401L ¹	Plant Biotechnology Laboratory	0	0	4	2
21BTC402J	Bio Separation Technology	3	0	2	4
Total Credits 56					
Open Elective Courses (O) (Any 3 Courses)					
Course Code	Course Title	Hours / Week			
		L	T	P	C
21BTO101T	Human Health and Diseases	3	0	0	3
21BTO105T	Animal Models for Biomedical Research	3	0	0	3
21BTO106T	Waste to Wealth to Wheels	3	0	0	3
21BTO107T	Fundamental Neurobiology	3	0	0	3
Total Credits 09					
Project Work, Seminar, Internship in Industry / Higher Technical Institutions (P)					
Course Code	Course Title	Hours / Week			
		L	T	P	C
21GNP301L ¹	Community Connect	0	0	2	1
21BTP302L ¹	Project	0	0	6	3
21BTP303T ¹	MOOC	3	0	0	
21BTP401L	Major Project	0	0	30	
21BTP402L	Major Project	0	0	20	10
21BTP403L	Internship#	0	0	10	5
Total Credits 19					

Professional Elective Courses (E) (Any 5 Courses)					
Course Code	Course Title	Hours / Week			
		L	T	P	C
21BTE206T	Molecular Cell Biology	3	0	0	3
21BTE311T	Cell Communication and Signaling	3	0	0	3
21BTE312T	Stem Cell Technology	3	0	0	3
21BTE313T	Biomaterials in Tissue Engineering	3	0	0	3
21BTE314T	Nanotechnology in Regenerative Medicine	3	0	0	3
21BTE416T	Tissue Engineering for Regenerative Medicine	3	0	0	3

Professional Elective Courses (E)					
Course Code	Course Title	Hours / Week			
		L	T	P	C
21BTE417T	Bioreactors in Tissue Engineering	3	0	0	3
21BTE418T	Developmental Biology in Tissue Engineering	3	0	0	3
21BTE419T	Advanced Immunology and Vascular Tissue Engineering	3	0	0	3
Total Credits					15



10. (f) Programme Articulation: B.Tech. in Biotechnology with Specialization in Regenerative Medicine

Course Code	Course Name	Program Outcomes (PO)												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
21BTB105T	Cell Biology	2	3	3	3	2	-	-	-	-	-	-	-	-	2.6	3
21BTC101T	Biochemistry	3	2.5	3	3	3	-	-	-	-	-	-	-	2	2.7	-
21BTC201L	Biochemistry Laboratory	3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC202T	Microbiology	2.6	2	2.2	2	2	-	-	-	-	-	-	-	2.6	-	-
21BTC203L	Cell and Microbiology Laboratory	-	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21BTC204T	Bioprocess Principles	2	2.5	1.5	1.8	2	-	-	-	-	-	-	-	2	2	1.5
21BTC205L	Bioprocess Principles Laboratory	2.2	2.5	1.5	1.8	2	-	-	-	-	-	-	-	2	2	1.5
21BTC206T	Genetics and Cytogenetics	2.6	2.4	2.5	2.2	-	-	-	-	-	-	-	-	2.6	-	-
21BTC207T	Molecular Biology	3	2.3	2	1	-	-	-	-	-	-	-	-	2.6	2.8	-
21BTC208L	Molecular Biology Laboratory	3	2.8	2.3	-	-	-	-	-	-	-	-	-	2.6	2.8	-
21BTC209T	Bioprocess Engineering	2.4	1.5	2.2	1.8	3	-	-	-	-	-	-	-	1.5	2	2
21BTC210L	Bioprocess Engineering Laboratory	2.6	2.8	1.5	-	3	-	-	-	-	-	-	-	2	2	-
21BTC301J	Gene manipulation and Genomics	2.7	-	2.8	-	-	2.5	-	2	-	-	-	-	-	2	3
21BTC302J	Immunology	-	-	2	2.5	2.5	1	-	-	-	-	-	-	1.5	-	2.5
21BTC303T	Protein engineering	2	2	-	2	3	-	-	-	-	-	-	-	-	3	3
21BTC304T	Animal Biotechnology	3	3	2.7	2.5	-	-	-	-	-	-	-	-	3	3	3
21BTC305L	Animal biotechnology Laboratory	-	2.5	3	2.7	2	-	-	-	-	-	-	-	2	3	3
21BTC306T	Plant Biotechnology	3	2	2.7	-	3	-	3	-	-	-	-	-	-	2.8	3
21BTC401L	Plant Biotechnology Laboratory	2.8	2.3	2.5	3	2	-	-	-	-	-	-	-	2.7	3	-
21BTC402J	Bio separation Technology	1.5	2.4	1.6	-	-	-	-	-	-	-	-	-	1.5	2	1.4
21BTM191T	Bioethics and IPR	-	2.4	-	-	-	-	-	3	-	-	-	-	-	-	-
21BTE206T	Molecular Cell Biology	2.8	2.2	2.3	2.4	-	-	-	-	-	-	-	-	2.6	-	-
21BTE311T	Cell Communication and Signaling	2.8	2.2	2.3	2.4	-	-	-	-	-	-	-	-	2.6	-	-
21BTE312T	Stem Cell Technology	-	-	-	2.4	-	-	-	3	-	-	-	-	2	3	-
21BTE313T	Biomaterials in Tissue Engineering	2	-	2	2	-	-	-	2.6	-	-	-	-	2	3	-
21BTE314T	Nanotechnology in Regenerative Medicine	3	2.5	3	2.2	-	-	-	-	-	-	-	-	2.6	-	-
21BTE416T	Tissue Engineering for Regenerative Medicine	2.6	2.4	2.8	2	-	-	-	-	-	-	-	-	-	2.4	2.3
21BTE417T	Bioreactors in Tissue Engineering	2.8	2.2	2.3	2.4	-	-	-	-	-	-	-	-	2.6	-	-
21BTE418T	Developmental Biology in Tissue Engineering	-	-	-	2.4	-	-	-	-	-	-	-	-	-	-	2.3
21BTE419T	Advanced Immunology and Vascular Tissue Engineering	2.2	2.8	-	2	2	-	-	-	-	-	-	-	2	2.8	2
21GNP301L	Community Connect	3	2	2	-	-	-	-	-	-	2	-	2	2	2	-
21BTP302L	Project	3	2	2	-	-	-	-	-	-	2	-	2	2	2	-
21BTP303T	MOOC	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
21BTP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21BTP402L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21BTP403L	Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Program Average		2.6	2.5	2.4	2.4	2.5	2.3	2.8	2.8	3.0	2.8	3.0	2.8	2.3	2.6	2.6

10. (g) Implementation Plan: B.Tech. in Biotechnology with Specialization in Regenerative Medicine

Semester – I						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21LEH101T	Communicative English	2	1	0	3	
21MAB101T	Calculus and Linear Algebra	3	1	0	4	
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5	
21MES102L	Engineering Graphics and Design	0	0	4	2	
21EES101T	Electrical and Electronics Engineering	3	1	0	4	
21CYM101T	Environmental Science*	1	0	0	0	
21PDM101L	Professional Skills and Practices	0	0	2	0	
21LEM101T	Constitution of India	1	0	0	0	
Total Credits					18	
Semester – II						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21LEH102T	Chinese	2	1	0	3	
21LEH103T	French					
21LEH104T	German					
21LEH105T	Japanese					
21LEH106T	Korean					
21LEH107T	Spanish					
21LEH108T	Russian					
21GNH101J	Philosophy of Engineering	1	0	2	2	
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4	
21CYB101J	Chemistry	3	1	2	5	
21BTB105T	Cell Biology	2	0	0	2	
21CSS101J	Programming for Problem Solving	3	0	2	4	
21BTC101T	Biochemistry	3	0	0	3	
21MES101L	Basic Civil and Mechanical Workshop	0	0	4	2	
21PDM102L	General Aptitude*	0	0	2	0	
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0	
21GNM102L	National Service Scheme					
21GNM103L	National Cadet Corps					
21GNM104L	National Sports Organization					
Total Credits					25	
Semester – IV						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21CHS252J	Chemical Engineering Principles	3	0	2	4	
21CSC206T	Artificial Intelligence	3	0	0	3	
21BTC207T	Molecular Biology	3	0	0	3	
21BTC208L	Molecular Biology Laboratory	0	0	4	2	
21BTC209T	Bioprocess Engineering	3	0	0	3	
21BTC210L	Bioprocess Engineering Laboratory	0	0	4	2	
E	Professional Elective – I	3	0	0	3	
21DCS201P	Design Thinking and Methodology	1	2	0	3	
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0	
Total Credits					23	
Semester – VI						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21CSS303T	Data Science	1	1	0	2	
21BTC304T	Animal Biotechnology	3	0	0	3	
21BTC305L	Animal Biotechnology Laboratory	0	0	4	2	
21BTC306T	Plant Biotechnology	3	0	0	3	
E	Professional Elective – III	3	0	0	3	
O	Open Elective – II	3	0	0	3	
21BTP302L	Project	0	0	6	3	
21BTP303T	MOOC	3	0	0		
21LEM302T	Indian Traditional Knowledge	1	0	0	0	
21PDM302L	Employability Skills and Practices	0	0	2	0	
Total Credits					19	
Semester - VIII						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21BTP401L	Major Project	0	0	30	15	
21BTP402L	Major Project	0	0	20	10	
21BTP403L	Internship#	0	0	10	5	
Total Credits					15	

#Students have to register either 21BTP401L or 21BTP402L and 21BTP403L both in eighth semester



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