

# **ACADEMIC CURRICULA**

## **UNDERGRADUATE DEGREE PROGRAMMES**

### **Bachelor of Technology**

**(B.Tech. - Four Years)**

**(Choice Based Flexible Credit System)**

**Regulations 2018**

**Volume - 1**

**(Revised in March 2019)**



**SRM**

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

**SRM INSTITUTE OF SCIENCE AND  
TECHNOLOGY**

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

**Kattankulathur, Kancheepuram District 603203, Tamil Nadu,  
India**

## 4. B.Tech. in Biotechnology

### 4. (a) Mission of the Department

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

### 4. (b) Program Educational Objectives (PEO)

PEO - 1	To impart knowledge in biological and chemical sciences for application in biological systems
PEO - 2	To develop skills in basic and applied fields of biotechnology leading to professionalism and leadership
PEO - 3	To provide hands-on training to students for carrying out independent research projects in emerging areas of biotechnology

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

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

H – High Correlation, M – Medium Correlation, L – Low Correlation

### 4. (d) Mapping Program Educational Objectives (PEO) to Program Learning Outcomes (PLO)

	Program Learning Outcomes (PLO)												Program Specific Outcomes (PSO)		
	Graduate Attributes (GA)														
	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
PEO - 1	H	M	M	H	H	H	H	H	H	M	H	H	H	H	H
PEO - 2	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
PEO - 3	M	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H – High Correlation, M – Medium Correlation, L – Low Correlation

### PSO – Program Specific Outcomes (PSO)

PSO - 1	Ability to integrate biology and engineering technology for application in industry and research
PSO - 2	Able to implement the biotechnology concepts in the applied fields of biotechnology
PSO - 3	Able to contribute towards the advancement of biotechnology in the fields of research and management

#### 4. (e) Program Structure: B.Tech. in Biotechnology

Humanities & Social Sciences including Management Courses (H)					
Course Code	Course Title	Hours/ Week			C
		L	T	P	
18LEH101J	English	2	0	2	3
18LEH102J	Chinese				
18LEH103J	French				
18LEH104J	German	2	0	2	3
18LEH105J	Japanese				
18LEH106J	Korean				
18PDH101T	General Aptitude	0	0	2	1
18PDH102T	Management Principles for Engineers	2	0	0	2
18PDH103T	Social Engineering	2	0	0	2
18PDH201T	Employability Skills & Practices	0	0	2	1
Total Learning Credits					12

Engineering Science Courses (S)					
Course Code	Course Title	Hours/ Week			C
		L	T	P	
18MES101L	Engineering Graphics and Design	1	0	4	3
18MES102J	Basic Civil and Mechanical Engineering	3	1	2	5
18EES102L	Electrical and Electronics Eng. Workshop	1	0	4	3
18CSS101J	Programming for Problem Solving	3	0	4	5
18CHS251T	Basic Chemical Engineering	3	0	0	3
18CHS252T	Chemical Engineering Principles	3	0	0	3
18CHS253L	Chemical Engineering Practice	0	0	4	2
Total Learning Credits					24

Professional Elective Courses (E) (Any 6 Courses)					
Course Code	Course Title	Hours/ Week			C
		L	T	P	
Sub-stream: Medical Biotechnology					
18BTE301T	Developmental Biology	3	0	0	3
18BTE302T	Cellular & Molecular Neuroscience	3	0	0	3
18BTE303T	Metabolic Disorders	3	0	0	3
18BTE304T	Infectious Diseases	3	0	0	3
18BTE401T	Cancer Biology	3	0	0	3
18BTE402T	Physiology of Stress and its Management	3	0	0	3
Sub-stream: Pharmaceutical Biotechnology					
18BTE305T	Pharmaceutical Biotechnology	3	0	0	3
18BTE306T	Bioinformatics	3	0	0	3
18BTE307T	Drug Discovery and Drug Designing	3	0	0	3
18BTE308T	Marine Biotechnology	3	0	0	3
18BTE403T	Vaccine Biotechnology	3	0	0	3
18BTE404T	Molecular Basis of Drug action	3	0	0	3
Sub-stream: Plant and Food Biotechnology					
18BTE309T	Plant nutrition and physiology	3	0	0	3
18BTE310T	Plant Hormones and Signaling	3	0	0	3
18BTE311T	Pathogenesis-Related Proteins In Plants	3	0	0	3
18BTE312T	Food Science and Nutrition	3	0	0	3
18BTE405T	Therapeutic Compounds from Plants	3	0	0	3
18BTE406T	Food safety and quality Management	3	0	0	3
Sub-stream: Bioprocess Technology					
18BTE313T	Enzyme Engineering and Technology	3	0	0	3
18BTE314T	Membrane Technology	3	0	0	3
18BTE315T	Industrial Fermentation Technology	3	0	0	3
18BTE316T	Bioreactor Design	3	0	0	3
18BTE407T	Bioprocess Modelling and Simulation	3	0	0	3
18BTE408T	Bioprocess Plant Design	3	0	0	3
Sub-stream: Environmental Biotechnology					
18BTE317T	Environmental Biotechnology	3	0	0	3
18BTE318T	Industrial Waste Management	3	0	0	3
18BTE319T	Bioenergy	3	0	0	3
18BTE320T	Environmental Microbiology. & Metagenomics	3	0	0	3
18BTE409T	Bioremediation Technology	3	0	0	3
18BTE410T	Environmental Biosensors	3	0	0	3
Total Learning Credits					18

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
18LEM110L	Indian Art Form	0	0	2	0
18CYM101T	Environmental Science	1	0	0	0
18BTM191T	Bioethics and Intellectual Property Rights	1	0	0	0

Basic Science Courses (B)					
Course Code	Course Title	Hours/ Week			C
		L	T	P	
18PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
18CYB101J	Chemistry	3	1	2	5
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
18MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
18BTB103T	Human Physiology and Health	3	0	0	3
Total Learning Credits					25

Professional Core Courses (C)					
Course Code	Course Title	Hours/ Week			C
		L	T	P	
18BTC101J	Biochemistry	3	0	2	4
18BTC102J	Cell Biology	3	0	2	4
18BTC103J	Microbiology	3	0	2	4
18BTC104T	Genetics and Cytogenetics	3	0	0	3
18BTC105J	Molecular Biology	3	0	2	4
18BTC106J	Immunology	3	0	2	4
18BTC107J	Bioprocess Principles	3	0	2	4
18BTC108J	Plant Biotechnology	3	0	2	4
18BTC109J	Gene manipulation and Genomics	3	0	2	4
18BTC202J	Bioprocess Engineering	3	0	2	4
18BTC203J	Animal Biotechnology	3	0	2	4
18BTC204T	Protein engineering and proteomics	3	0	0	3
18BTC301J	Bioseparation Technology	3	0	2	4
18BTC350T	Comprehension	0	1	0	1
Total Learning Credits					51

Open Elective Courses (O) (Any 5 Courses)					
Code	Course Title	L	T	P	C
18BTO101T	Human Health and diseases	3	0	0	3
18BTO102T	Modelling of biomolecules	3	0	0	3
18BTO103T	Activated carbon technology	3	0	0	3
18BTO104T	Defense Forces in our body	3	0	0	3
18BTO105T	Animal Models for Research	3	0	0	3
18BTO106T	Waste to Wealth to Wheels	3	0	0	3
18BTO107T	Fundamental Neurobiology	3	0	0	3
Total Learning Credits					15

7. Project Work, Seminar, Internship In Industry/ Higher Technical Institutions (P)					
Code	Course Title	L	T	P	C
18BTP101L	Massive Open Online Course - I	0	0	2	1
18BTP102L	Industrial Training-I				
18BTP103L	Seminar - I				
18BTP104L	Massive Open Online Course - II	0	0	2	1
18BTP105L	Industrial Training-II				
18BTP106L	Seminar - II				
18BTP107L	Minor Project	0	0	6	3
18BTP108L	Internship (4-6 weeks)				
18BTP109L	Project				
18BTP110L	Semester Internship	0	0	20	10
Total Learning Credits					15

Mandatory Courses (M)					
Code	Course Title	L	T	P	C
18PDM101L	Professional Skills and Practices	0	0	2	0
18PDM201L	Competencies in Social Skills	0	0	2	0
18PDM203L	Entrepreneurial Skill Development				
18PDM202L	Critical and Creative Thinking Skills				
18PDM204L	Business Basics for Entrepreneurs	0	0	2	0
18PDM301L	Analytical and Logical Thinking Skills				
18PDM302L	Entrepreneurship Management				
18LEM101T	Constitution of India	1	0	0	0
18LEM102J	Value Education	1	0	1	0
18GNM101L	Physical and Mental Health using Yoga	0	0	2	0
18GNM102L	NSS	0	0	2	0
18GNM103L	NCC				
18GNM104L	NSO				
18LEM109T	Indian Traditional Knowledge	1	0	0	0

#### 4. (f) Program Articulation (B.Tech. in Biotechnology)

Course Code	Course Name	Program Learning Outcomes (PLO)												
		Graduate Attributes											PSO	
		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1
														PSO - 2
														PSO - 3
18BTC101J	Biochemistry	M	M	H	H	H	H	M	H	H	H	H	H	H
18BTC102J	Cell Biology	M	M	H	H	H	M	M	H	H	H	H	H	H
18BTC103J	Microbiology	M	M	H	H	H	H	H	H	H	H	H	H	H
18BTC104T	Genetics and Cytogenetics	H	H	H	H	H	M	M	H	H	H	H	H	H
18BTC105J	Molecular Biology	H	H	M	H	H	M	H	H	H	H	H	H	H
18BTC106J	Immunology	M	H	M	H	H	M	M	H	H	H	H	H	H
18BTC107J	Bioprocess Principles	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTC108J	Plant Biotechnology	M	H	H	H	H	H	H	H	H	H	H	H	H
18BTC201J	Gene manipulation and Genomics	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTC202J	Bioprocess Engineering	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTC203J	Animal Biotechnology	M	H	H	H	H	H	H	H	H	H	H	H	H
18BTC204T	Protein engineering and proteomics	H	H	H	H	H	H	M	H	H	H	H	H	H
18BTC301J	Bioseparation Technology	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE301T	Developmental Biology	M	M	H	H	H	M	H	H	H	H	H	H	H
18BTE302T	Cellular & Molecular Neuroscience	M	M	H	H	H	M	M	H	H	H	H	H	H
18BTE303T	Metabolic Disorders	M	M	H	H	H	H	H	H	H	H	H	H	H
18BTE304T	Infectious Diseases	H	H	H	H	H	M	M	H	H	H	H	H	H
18BTE401T	Cancer Biology	H	H	M	H	H	M	H	H	H	H	H	H	H
18BTE402T	Physiology of Stress and its Management	M	H	M	H	H	M	H	H	H	H	H	H	H
18BTE305T	Pharmaceutical Biotechnology	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE306T	Bioinformatics	M	H	H	H	H	H	H	H	H	H	H	H	H
18BTE307T	Drug Discovery and Drug Designing	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE308T	Marine Biotechnology	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE403T	Vaccine Biotechnology	M	H	H	H	H	H	H	H	H	H	H	H	H
18BTE404T	Molecular Basis of Drug action	H	H	H	H	H	H	M	H	H	H	H	H	H
18BTE309T	Plant nutrition and physiology	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE310T	Plant Hormones and Signaling	M	M	H	H	H	M	H	H	H	H	H	H	H
18BTE311T	Pathogenesis-Related Proteins In Plants	M	M	H	H	H	M	M	H	H	H	H	H	H
18BTE312T	Food Science and Nutrition	M	M	H	H	H	H	H	H	H	H	H	H	H
18BTE405T	Therapeutic Compounds from Plants	H	H	H	H	H	M	M	H	H	H	H	H	H
18BTE406T	Food safety and quality Management	H	H	M	H	H	M	H	H	H	H	H	H	H
18BTE313T	Enzyme Engineering and Technology	M	H	M	H	H	M	M	H	H	H	H	H	H
18BTE314T	Membrane Technology	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE315T	Industrial Fermentation Technology	M	H	H	H	H	H	H	H	H	H	H	H	H
18BTE316T	Bioreactor Design	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE407T	Bioprocess Modelling and Simulation	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE408T	Bioprocess Plant Design	M	H	H	H	H	H	H	H	H	H	H	H	H
18BTE317T	Environmental Biotechnology	H	H	H	H	H	H	M	H	H	H	H	H	H
18BTE318T	Industrial Waste Management	H	M	M	M	M	M	M	M	H	H	M	H	H
18BTE319T	Bioenergy	H	M	M	M	M	M	M	M	H	H	M	H	H
18BTE320T	Environmental Microbiology. & Metagenomics	H	H	H	H	H	M	M	H	H	H	H	M	M
18BTE409T	Bioremediation Technology	H	H	H	H	H	M	M	H	H	H	H	M	M
18BTE410T	Environmental Biosensors	H	H	H	H	H	M	M	H	H	H	H	M	M
18BTP101L	Massive Open Online Course - I	H	M	M	M	M	M	M	M	H	H	M	H	H
18BTP102L	Industrial Training-I	H	M	M	M	M	M	M	M	H	H	M	H	H
18BTP103L	Seminar - I	H	M	M	M	M	M	M	M	H	H	M	H	H
18BTP104L	Massive Open Online Course - II	H	M	M	M	M	M	M	M	H	H	M	H	H
18BTP105L	Industrial Training-II	H	M	M	M	M	M	M	M	H	H	M	H	H
18BTP106L	Seminar - II	H	M	M	M	M	M	M	M	H	H	M	H	H
18BTP107L	Minor Project	H	H	H	H	H	M	M	H	H	H	H	M	M
18BTP108L	Internship (4-6 weeks)	H	H	H	H	H	M	M	H	H	H	H	M	M
18BTP109L	Project	H	H	H	H	H	M	M	H	H	H	H	M	M
18BTP110L	Semester Internship	H	H	H	H	H	M	M	H	H	H	H	M	M
	Program Average	H	H	H	H	H	H	H	H	H	H	H	H	H

H – High Correlation, M – Medium Correlation, L – Low Correlation

#### 4. (g) Implementation Plan: B.Tech.in Biotechnology

Semester - I						Semester - II					
Code	Course Title	Hours/ Week			C	Code	Course Title	Hours/ Week			C
		L	T	P				L	T	P	
18LEH101J	English	2	0	2	3	18LEH10XJ	Chinese / French / German / Japanese/ Korean	2	0	2	3
18MAB101T	Calculus and Linear Algebra	3	1	0	4	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
18PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5	18CYB101J	Chemistry	3	1	2	5
18MES101L	Engineering Graphics and Design	1	0	4	3	18CSS101J	Programming for Problem Solving	3	0	4	5
18MES102J	Basic Civil and Mechanical Engineering	3	1	2	5	18EES102L	Electrical and Electronics Eng. Workshop	1	0	4	3
18PDM101L	Professional Skills and Practices	0	0	2	0	18PDH101T	General Aptitude	0	0	2	1
18LEM101T	Constitution of India	1	0	0	0	18LEM102J	Value Education	1	0	1	0
18GNM101L	Physical and Mental Health using Yoga	0	0	2	0	18GNM102L	NSS				
						18GNM103L	NCC	0	0	2	0
						18GNM104L	NSO				
Total Learning Credits					20	Total Learning Credits					21
Semester - III						Semester - IV					
Code	Course Title	Hours/ Week			C	Code	Course Title	Hours/ Week			C
		L	T	P				L	T	P	
18BTB103T	Human Physiology and Health	3	0	0	3	18CHS252T	Chemical Engineering Principles	3	0	0	3
18CHS251T	Basic Chemical Engineering	3	0	0	3	18BTC105J	Molecular Biology	3	0	2	4
18BTC101J	Biochemistry	3	0	2	4	18BTC106J	Immunology	3	0	2	4
18BTC102J	Cell Biology	3	0	2	4	18BTC107J	Bioprocess Principles	3	0	2	4
18BTC103J	Microbiology	3	0	2	4	18BTC108J	Plant Biotechnology	3	0	2	4
18BTC104T	Genetics and Cytogenetics	3	0	0	3		Open Elective - I	3	0	0	3
18PDH102T	Management Principles for Engineers	2	0	0	2	18PDH103T	Social Engineering	2	0	0	2
18PDM201L	Competencies in Social Skills	0	0	2	0	18PDM202L	Critical and Creative Thinking Skills	0	0	2	0
18PDM203L	Entrepreneurial Skill Development					18PDM204L	Business Basics for Entrepreneurs				
						18CYM101T	Environmental Science	1	0	0	0
Total Learning Credits					23	Total Learning Credits					24
Semester - V						Semester - VI					
Code	Course Title	Hours/ Week			C	Code	Course Title	Hours/ Week			C
		L	T	P				L	T	P	
18CHS253L	Chemical Engineering Practice	0	0	4	2	18MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
18BTC201J	Gene manipulation and Genomics	3	0	2	4	18BTC203J	Animal Biotechnology	3	0	2	4
18BTC202J	Bioprocess Engineering	3	0	2	4	18BTC204T	Protein engineering and proteomics	3	0	0	3
	Professional Elective – 1	3	0	0	3	18BTC350T	Comprehension	0	1	0	1
	Professional Elective – 2	3	0	0	3		Professional Elective – 3	3	0	0	3
	Open Elective – 2	3	0	0	3		Professional Elective – 4	3	0	0	3
	Open Elective – 3	3	0	0	3		Open Elective – 4	3	0	0	3
18BTP101L	Massive Open Online Course - I					18PDH201T	Employability Skills and Practices	0	0	2	1
18BTP102L	Industrial Training-I	0	0	2	1	18BTP104L	Massive Open Online Course - II				
18BTP103L	Seminar - I					18BTP105L	Industrial Training-II	0	0	2	1
18PDM301L	Analytical and Logical Thinking Skills	0	0	2	0	18BTP106L	Seminar - II				
18PDM302L	Entrepreneurship Management					18LEM110L	Indian Art Form	0	0	2	0
18LEM109T	Indian Traditional Knowledge	1	0	0	0						
Total Learning Credits					23	Total Learning Credits					23
Semester - VII						Semester - VIII					
Code	Course Title	Hours/ Week			C	Code	Course Title	Hours/ Week			C
		L	T	P				L	T	P	
18BTC301J	Bioprocess Technology	3	0	2	4	18BTP109L	Project	0	0	20	10
	Professional Elective – 5	3	0	0	3	18BTP110L	Semester Internship				
	Professional Elective – 6	3	0	0	3						
	Open Elective – 5	3	0	0	3						
18BTP107L	Minor Project	0	0	6	3						
18BTP108L	Internship (4-6 weeks)										
18BTM191T	Bioethics and Intellectual Property Rights	1	0	0	0						
Total Learning Credits					16	Total Learning Credits					10