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 AND TECHNOLOGY

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

Kattankulathur, Kancheepuram District 603203, Tamil Nadu, India

6. B.Tech. in Biotechnology with Specialization in Genetic Engineering

6. (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*

6. (b) Program Educational Objectives (PEO)

PEO - 1	*To identify and solve clinical, industrial and agricultural problems through genetic engineering*
PEO - 2	*To gain knowledge in cloning strategies for bacteria, yeast, plants and animals.*
PEO - 3	*To know the economic, environmental, and social implications of genetic engineering research.*

6. (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

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

	Program Learning Outcomes (PLO)														
	Graduate Attributes (GA)												Program Specific Outcomes (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
PEO - 1	*H*	*M*	*M*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*
PEO - 2	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*
PEO - 3	*M*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*

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

PSO – Program Specific Outcomes (PSO)

PSO - 1	*Ability to solve scientific problems through genetic approaches.*
PSO - 2	*Ability to implement the knowledge gained in the applied fields of genetic engineering.*
PSO - 3	*Ability to understand social and ethical responsibilities of genetic research.*

6. (e) Program Structure: B.Tech. in Biotechnology with Specialization in Genetic Engineering

Humanities & Social Sciences including Management Courses (H)

Course Code	Course Title	Hours/ Week L	T	P	C
18LEH101J	English	2	0	2	3
18LEH102J	Chinese	2	0	2	3
18LEH103J	French				
18LEH104J	German				
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 L	T	P	C
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**

5. Professional Elective Courses (E)
(Any 6 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
18BTE420T	Human Genetics	3	0	0	3
18BTE421T	High Throughput Technologies in advanced biology	3	0	0	3
18BTE422T	Metabolic Engineering of microbes	3	0	0	3
18BTE423T	Genetics of Crop Improvement	3	0	0	3
18BTE424T	Molecular biology of Infectious diseases	3	0	0	3
18BTE425T	Molecular Diagnostics	3	0	0	3
18BTE426T	Gene therapy	3	0	0	3
18BTE427T	Functional genomics	3	0	0	3
18BTE428T	Plant Interactions	3	0	0	3
	Total Learning Credits				**18**

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	0	0	20	10
18BTP110L	Semester Internship				
	Total Learning Credits				**15**

Basic Science Courses (B)

Course Code	Course Title	Hours/ Week L	T	P	C
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 L	T	P	C
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
18BTC201J	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)

Course Code	Course Title	Hours/ Week 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**

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	0	0	2	0
18PDM204L	Business Basics for Entrepreneurs				
18PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
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
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

6. (f) Program Articulation: B.Tech. in Biotechnology with Specialization in Genetic Engineering

Course Code	Course Name	Program Learning Outcomes (PLO)												PSO		
		Graduate Attributes														
		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	H	H
18BTC102J	Cell Biology	M	M	H	H	H	M	M	H	H	H	H	H	H	H	H
18BTC103J	Microbiology	M	M	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTC104T	Genetics and Cytogenetics	H	H	H	H	H	H	M	M	H	H	H	H	H	H	H
18BTC105J	Molecular Biology	H	H	M	H	H	H	M	H	H	H	H	H	H	H	H
18BTC106J	Immunology	M	H	M	H	H	M	M	H	H	H	H	H	H	H	H
18BTC107J	Bioprocess Principles	H	H	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	H	H
18BTC201J	Gene manipulation and Genomics	H	H	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	H	H
18BTC203J	Animal Biotechnology	M	H	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTC204T	Protein engineering and proteomics	H	H	H	H	H	H	H	M	H	H	H	H	H	H	H
18BTC301J	Bioseparation Technology	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE420T	Human Genetics	M	M	H	H	H	H	M	H	H	H	H	H	H	H	H
18BTE421T	High Throughput Technologies in advanced biology	M	M	H	H	H	M	M	H	H	H	H	H	H	H	H
18BTE422T	Metabolic Engineering of microbes	M	M	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE423T	Genetics of Crop Improvement	H	H	H	H	H	H	M	M	H	H	H	H	H	H	H
18BTE424T	Molecular biology of Infectious diseases	H	H	M	H	H	H	M	H	H	H	H	H	H	H	H
18BTE425T	Molecular Diagnostics	M	H	M	H	H	M	M	H	H	H	H	H	H	H	H
18BTE426T	Gene therapy	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE427T	Functional genomics	M	H	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTE428T	Plant Interactions	M	H	H	H	H	H	H	H	H	H	H	H	H	H	H
18BTP101L	Massive Open Online Course - I	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18BTP102L	Industrial Training-I	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18BTP103L	Seminar - I	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18BTP104L	Massive Open Online Course - II	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18BTP105L	Industrial Training-II	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18BTP106L	Seminar - II	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18BTP107L	Minor Project	H	H	H	H	H	M	M	H	H	H	H	H	H	M	M
18BTP108L	Internship (4-6 weeks)	H	H	H	H	H	M	M	H	H	H	H	H	H	M	M
18BTP109L	Project	H	H	H	H	H	M	M	H	H	H	H	H	H	M	M
18BTP110L	Semester Internship	H	H	H	H	H	M	M	H	H	H	H	H	H	M	M
	Program Average	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

6. (g) Implementation Plan: B.Tech. in Biotechnology with Specialization in Genetic Engineering

Semester - I

Code	Course Title	Hours/ Week L	T	P	C
18LEH101J	English	2	0	2	3
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5
18MES101L	Engineering Graphics and Design	1	0	4	3
18MES102J	Basic Civil and Mechanical Engineering	3	1	2	5
18PDM101L	Professional Skills and Practices	0	0	2	0
18LEM101T	Constitution of India	1	0	0	0
18GNM101L	Physical and Mental Health using Yoga	0	0	2	0
	Total Learning Credits				**20**

Semester - II

Code	Course Title	Hours/ Week L	T	P	C
18LEH10XJ	Chinese / French / German / Japanese/ Korean	2	0	2	3
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
18CYB101J	Chemistry	3	1	2	5
18CSS101J	Programming for Problem Solving	3	0	4	5
18EES102L	Electrical and Electronics Eng. Workshop	1	0	4	3
18PDH101T	General Aptitude	0	0	2	1
18LEM102J	Value Education	1	0	1	0
18GNM102L	NSS	0	0	2	0
18GNM103L	NCC				
18GNM104L	NSO				
	Total Learning Credits				**21**

Semester - III

Code	Course Title	Hours/ Week L	T	P	C
18BTB103T	Human Physiology and Health	3	0	0	3
18CHS251T	Basic Chemical Engineering	3	0	0	3
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
18PDH102T	Management Principles for Engineers	2	0	0	2
18PDM201L	Competencies in Social Skills	0	0	2	0
18PDM203L	Entrepreneurial Skill Development				
	Total Learning Credits				**23**

Semester - IV

Code	Course Title	Hours/ Week L	T	P	C
18CHS252T	Chemical Engineering Principles	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
	Open Elective - I	3	0	0	3
18PDH103T	Social Engineering	2	0	0	2
18PDM202L	Critical and Creative Thinking Skills	0	0	2	0
18PDM204L	Business Basics for Entrepreneurs				
18CYM101T	Environmental Science	1	0	0	0
	Total Learning Credits				**24**

Semester - V

Code	Course Title	Hours/ Week L	T	P	C
18CHS253L	Chemical Engineering Practice	0	0	4	2
18BTC201J	Gene manipulation and Genomics	3	0	2	4
18BTC202J	Bioprocess Engineering	3	0	2	4
	Professional Elective – 1	3	0	0	3
	Professional Elective – 2	3	0	0	3
	Open Elective – 2	3	0	0	3
	Open Elective – 3	3	0	0	3
18BTP101L	Massive Open Online Course - I	0	0	2	1
18BTP102L	Industrial Training-I				
18BTP103L	Seminar - I				
18PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
18PDM302L	Entrepreneurship Management				
18LEM109T	Indian Traditional Knowledge	1	0	0	0
	Total Learning Credits				**23**

Semester - VI

Code	Course Title	Hours/ Week L	T	P	C
18MAB303T	Bio-Statistics for Biotechnologists	3	1	0	4
18BTC203J	Animal Biotechnology	3	0	2	4
18BTC204T	Protein engineering and proteomics	3	0	0	3
18BTC350T	Comprehension	0	1	0	1
	Professional Elective – 3	3	0	0	3
	Professional Elective – 4	3	0	0	3
	Open Elective – 4	3	0	0	3
18PDH201T	Employability Skills and Practices	0	0	2	1
18BTP104L	Massive Open Online Course - II	0	0	2	1
18BTP105L	Industrial Training-II				
18BTP106L	Seminar - II				
18LEM110L	Indian Art Form	0	0	2	0
	Total Learning Credits				**23**

Semester - VII

Code	Course Title	Hours/ Week L	T	P	C
18BTC301J	Bioseparation Technology	3	0	2	4
	Professional Elective – 5	3	0	0	3
	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**

Semester - VIII

Code	Course Title	Hours/ Week L	T	P	C
18BTP109L	Project	0	0	20	10
18BTP110L	Semester Internship				
	Total Learning Credits				**10**