

ACADEMIC CURRICULA

UNDERGRADUATE DEGREE PROGRAMMES

Bachelor of Technology

(B.Tech. - Four Years)

(Choice Based Flexible Credit System)

Regulations 2018

Volume - 1

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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**

33. B.Tech. in Nanotechnology

33. (a) Mission of the Department

Mission Stmt - 1	Actively contribute for the development of nanoscience, engineering and technology through world-class infrastructure, teaching & research
Mission Stmt - 2	Establish collaborative research with the institutions of national and international repute
Mission Stmt - 3	Encourage industry-academia interactions to translate scientific findings into technological development to meet the societal needs
Mission Stmt - 4	Organize and actively participate in workshops, conferences and seminars on advancements in nanoscience and nanotechnology
Mission Stmt - 5	Focus on developing skills of students to enhance the employability in various organizations

33. (b) Program Educational Objectives (PEO)

PEO - 1	Provide understanding of physical, chemical and biological principles in the multi-disciplinary field of nanoscience and nanotechnology
PEO - 2	Develop skills on the synthesis of nanomaterials and fabrication of micro- and nano-structures
PEO - 3	Familiarize the graduates with the advanced nanoscale characterization techniques and develop the analytical ability
PEO - 4	Enable graduates with professional, scientific research, and computational skills for employment in industries, R & D centres and higher education
PEO - 5	Prepare the graduates to take individual and team work responsibilities in a multidisciplinary environment

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

	Mission Stmt - 1	Mission Stmt - 2	Mission Stmt - 3	Mission Stmt - 4	Mission Stmt - 5
PEO - 1	H	M	L	H	L
PEO - 2	H	H	M	H	H
PEO - 3	H	H	M	H	M
PEO - 4	H	M	H	M	H
PEO - 5	M	H	H	H	M

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

33. (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	H	M	H	M	M	M	H	H	H	M	H	H	H	M
PEO - 2	H	H	H	H	H	M	L	H	H	H	M	H	H	H	H
PEO - 3	H	H	H	H	H	M	M	H	H	H	M	H	H	H	H
PEO - 4	H	H	M	H	H	H	H	H	M	M	H	H	H	H	H
PEO - 5	L	L	M	M	L	M	H	H	H	M	H	M	H	M	H

H – High Correlation, M – Medium Correlation, L – Low Correlation, PSO – Program Specific Outcomes (PSO)

PSO – Program Specific Outcomes (PSO)

PSO - 1	Ability to understand materials and their properties at the atomic and nanometer scales, including an understanding of the intimate relationship between the scale and the properties of materials
PSO - 2	Ability to apply the learnt nanotechnology principles, analyze, evaluate and design advanced systems & processes
PSO - 3	Ability to employ the acquired skills in nanotechnology for the benefit of self and society

33. (e) Program Structure: B.Tech. in Nanotechnology

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

Engineering Science Courses (S)				
Course Code	Course Title	Hours/ Week		
		L	T	P
18MES101L	Engineering Graphics and Design	1	0	4
18EES101J	Basic Electrical and Electronics Engineering	3	1	2
18MES103L	Civil and Mechanical Engineering Workshop	1	0	4
18CSS101J	Programming for Problem Solving	3	0	4
18PYS201T	Materials Science	3	0	0
18NTS101T	Nanoscience and Nanotechnology	3	0	0
Total Learning Credits				22

Open Elective Courses (O) (Any 4 Courses)				
Course Code	Course Title	Hours/ Week		
		L	T	P
18NTO301T	Applications of Nanotechnology	3	0	0
18NTO302T	Solid State Electronic Devices	3	0	0
18NTO303T	Micro and Nanoelectronics	3	0	0
18NTO304T	Environmental Nanotechnology	3	0	0
18NTO305T	Medical Nanotechnology	3	0	0
18NTO306T	Nanoscale Surface Engineering	3	0	0
18NTO307T	Nanocomputing	3	0	0
18NTO308T	Smart Sensor Systems	3	0	0
18NTO401T	2D Materials and Applications	3	0	0
18NTO402T	Nano and Micro electromechanical Systems	3	0	0
18NTO403T	Scientific Research Principles	3	0	0
18NTO404T	Micro and Nanofluidic Technology	3	0	0
18NTO405T	Thin Film Photovoltaics	3	0	0
18NTO406T	Nanotechnology in Societal Development	3	0	0
18NTO407T	Polymer Engineering	3	0	0
18NTO408T	Industrial Nanotechnology	3	0	0
Total Learning Credits				12

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)				
Course Code	Course Title	Hours/ Week		
		L	T	P
18NTP101L	Massive Open Online Course - I			
18NTP102L	Industrial Training-I	0	0	2
18NTP103L	Seminar - I			
18NTP104L	Massive Open Online Course - II			
18NTP105L	Industrial Training-II	0	0	2
18NTP106L	Seminar - II			
18NTP107L	Minor Project	0	0	6
18NTP108L	Internship (4-6 weeks)			
18NTP109L	Project	0	0	20
18NTP110L	Semester Internship			
Total Learning Credits				15

Professional Elective Courses (E) (Any 6 Elective Courses)				
Course Code	Course Title	Hours/ Week		
		L	T	P
18NTE301T	Carbon Nanotechnology	3	0	0
18NTE302T	Physics of Solid State Devices	3	0	0
18NTE303T	Molecular spectroscopy and its applications	3	0	0
18NTE304T	Nanotribology	3	0	0
18NTE305T	Nanotechnology Legal Aspects	3	0	0
18NTE306T	Lithographic Techniques and Fabrication	3	0	0

Basic Science Courses (B)				
Course Code	Course Title	Hours/ Week		
		L	T	P
18PYB103J	Physics: Semiconductor Physics	3	1	2
18CYB101J	Chemistry	3	1	2
18MAB101T	Calculus and Linear Algebra	3	1	0
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0
18MAB201T	Transforms and Boundary Value Problems	3	1	0
18MAB202T	Numerical Methods for Engineers	3	1	0
18MAB203T	Probability and Stochastic Processes	3	1	0
18BTB101T	Biology	2	0	0
Total Learning Credits				32

Professional Core Courses (C)				
Course Code	Course Title	Hours/ Week		
		L	T	P
18NTC101T	Nanoscale Chemistry	3	0	0
18NTC102T	Quantum Mechanics for Nanotechnologists	3	0	0
18NTC103L	Nanoscale Materials Laboratory	0	0	2
18NTC104T	Thermodynamics and Statistical Mechanics	3	0	0
18NTC105T	Biological Principles for Nanoscale Science	3	0	0
18NTC106T	Design and Synthesis of Nanomaterials	3	0	0
18NTC107J	Advanced Characterization of Nanomaterials	3	0	2
18NTC108T	Modeling and Computational Tools	3	0	0
18NTC109T	Solid State Engineering	3	0	0
18NTC201T	Nanophotonics	3	0	0
18NTC202J	Nanobiotechnology	3	0	2
18NTC203T	Nanotoxicology	3	0	0
18NTC204J	Nanoelectronics	3	0	2
18NTC205J	Micro and Nanofabrication	3	0	2
18NTC301J	Polymer and Nanocomposites	3	0	2
18NTC350T	Comprehension	0	1	0
Total Learning Credits				49

Mandatory Courses (M)				
Code	Course Title	Hours/ Week		
		L	T	P
18PDM101L	Professional Skills and Practices	0	0	2
18PDM201L	Competencies in Social Skills			
18PDM203L	Entrepreneurial Skill Development	0	0	2
18PDM202L	Critical and Creative Thinking Skills			
18PDM204L	Business Basics for Entrepreneurs	0	0	2
18PDM301L	Analytical and Logical Thinking Skills			
18PDM302L	Entrepreneurship Management	0	0	2
18LEM101T	Constitution of India	1	0	0
18LEM102J	Value Education	1	0	1
18GNM101L	Physical and Mental Health using Yoga	0	0	2
18GNM102L	NSS			
18GNM103L	NCC	0	0	2
18GNM104L	NSO			
18LEM109T	Indian Traditional Knowledge	1	0	0
18LEM110L	Indian Art Form	0	0	2
18CYM101T	Environmental Science	1	0	0

Professional Elective Courses (E)				
Course Code	Course Title	Hours/ Week		
		L	T	P
18NTE317T	Nanocatalysts	3	0	0
18NTE318T	Nano and Micro Emulsions	3	0	0
18NTE401T	Nanorobotics	3	0	0
18NTE402T	Micro and Nanofluids	3	0	0
18NTE403T	Nanotechnology for Energy Systems	3	0	0
18NTE404T	Photovoltaic technology	3	0	0
18NTE405T	Nanotechnology in Cosmetics	3	0	0

18NTE307T	Sensors and Transducers	3	0	0	3
18NTE308T	2D Layered Nanomaterials	3	0	0	3
18NTE309T	Supramolecular Systems	3	0	0	3
18NTE310T	MEMS and NEMS	3	0	0	3
18NTE311T	Surface and Interfaces	3	0	0	3
18NTE312T	Nano Technology in Food Production	3	0	0	3
18NTE313T	Advanced Drug Delivery Systems	3	0	0	3
18NTE314T	Nanomedicines	3	0	0	3
18NTE315T	Microelectronics and VLSI	3	0	0	3
18NTE316T	Physics of Electronic Materials	3	0	0	3
18NTE317T	Nanocatalysts	3	0	0	3
18NTE406T	Green Nanotechnology	3	0	0	3
18NTE407T	Advanced Computational Techniques	3	0	0	3
18NTE408T	Nanotechnology in Textiles	3	0	0	3
18NTE409T	Cancer Nanotechnology	3	0	0	3
18NTE410T	Vacuum and Thinfilm Technology	3	0	0	3
18NTE411T	Atomistic Modeling	3	0	0	3
18NTE412T	Societal Implications of Nanotechnology	3	0	0	3
18NTE413T	Nanotechnology In Tissue Engineering	3	0	0	3
18NTE414T	Nanomagnetism and Spintronics	3	0	0	3
Total Learning Credits					18

33. (f) Program Articulation: B.Tech. in Nanotechnology

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
18NTC101T	Nanoscale Chemistry	M	M	H	H	M	M	H	H	H	H	M	H	H	H	H
18NTC102T	Quantum Mechanics for Nanotechnologists	M	M	H	M	M	M	H	H	H	M	H	H	H	H	M
18NTC103L	Nanoscale Materials Laboratory	M	M	H	H	M	M	M	H	H	H	M	H	H	H	M
18NTC104T	Thermodynamics and Statistical Mechanics	M	H	H	H	M	M	L	M	M	H	L	H	H	H	H
18NTC105T	Biological Principles for Nanoscale Science	H	H	H	H	H	M	H	H	H	M	M	H	H	H	M
18NTC106T	Design and Synthesis of Nanomaterials	M	H	H	M	M	M	M	H	M	H	L	H	H	H	M
18NTC107J	Advanced Characterization of Nanomaterials	M	M	H	M	M	M	M	H	H	H	M	H	H	H	M
18NTC108T	Modeling and Computational Tools	M	M	H	H	H	M	M	H	H	H	M	H	H	H	H
18NTC109T	Solid State Engineering	H	M	H	H	H	M	M	H	H	H	M	H	H	H	H
18NTC201T	Nanophotonics	M	H	H	H	H	H	M	H	H	H	M	H	H	H	H
18NTC202J	Nanobiotechnology	H	M	M	M	M	H	M	H	M	M	M	H	H	H	H
18NTC203T	Nanotoxicology	H	M	M	H	H	H	M	H	H	H	L	H	H	H	H
18NTC204J	Nanoelectronics	H	H	M	M	M	M	H	H	H	H	M	H	H	H	H
18NTC205J	Micro and Nanofabrication	H	M	H	H	H	M	M	H	H	H	M	M	H	H	H
18NTC301J	Polymer and Nanocomposites	H	M	H	H	H	M	M	H	H	H	M	H	H	H	H
18NTE301T	Carbon Nanotechnology	H	H	H	H	M	M	M	H	H	H	M	H	H	H	H
18NTE302T	Physics of Solid State Devices	H	H	H	H	M	H	M	H	H	H	M	H	H	H	H
18NTE303T	Molecular spectroscopy and its applications	H	M	M	H	M	M	M	H	M	H	L	H	H	H	M
18NTE304T	Nanotribology	H	H	H	H	M	M	M	H	H	H	M	H	H	H	H
18NTE305T	Nanotechnology Legal Aspects	M	M	M	M	L	M	M	M	M	H	M	H	M	M	M
18NTE306T	Lithography Techniques and Fabrication	H	M	H	H	H	M	M	H	H	H	M	M	H	H	H
18NTE307T	Sensors and Transducers	H	M	H	H	H	M	M	H	H	H	M	M	H	H	H
18NTE308T	2D Layered Nanomaterials	M	H	H	H	H	H	M	H	H	H	M	H	H	H	H
18NTE309T	Supramolecular Systems	H	M	M	H	M	M	M	H	M	H	L	H	H	H	M
18NTE310T	MEMS and NEMS	H	M	H	H	H	M	M	H	H	H	M	M	H	H	H
18NTE311T	Surface and Interfaces	H	M	M	H	M	M	M	H	M	H	L	H	H	H	M
18NTE312T	Nano Technology in Food Production	M	H	M	M	M	H	H	H	M	H	H	H	H	H	H
18NTE313T	Advanced Drug Delivery Systems	H	M	M	H	H	H	M	H	H	H	L	H	H	H	H
18NTE314T	Nanomedicines	H	M	H	H	H	M	M	H	H	M	M	M	H	H	H
18NTE315T	Microelectronics and VLSI	H	H	H	H	H	M	M	H	H	H	M	M	H	H	H
18NTE316T	Physics of Electronic Materials	M	M	M	M	L	M	M	M	M	H	M	H	M	M	M
18NTE317T	Nanocatalysts	H	M	H	H	M	M	M	H	M	H	L	H	H	H	H
18NTE318T	Nano and Micro Emulsions	H	M	H	H	M	M	M	H	M	H	M	H	H	H	H
18NTE401T	Nanorobotics	H	H	H	H	H	H	M	H	H	H	M	H	H	H	H
18NTE402T	Micro and Nanofluids	H	M	H	H	M	M	M	H	M	H	M	M	H	H	H
18NTE403T	Nanotechnology for Energy Systems	H	H	H	H	H	H	M	H	M	H	H	H	H	H	H
18NTE404T	Photovoltaic technology	H	H	H	H	H	H	M	H	M	H	H	H	H	H	H
18NTE405T	Nanotechnology in Cosmetics	H	M	H	H	H	M	M	H	H	H	M	M	H	H	H
18NTE406T	Green Nanotechnology	H	M	H	H	H	H	M	H	M	H	H	H	H	H	M
18NTE407T	Advanced Computational Techniques	H	H	H	H	H	H	M	H	M	H	M	H	H	H	H
18NTE408T	Nanotechnology in Textiles	H	M	H	H	H	H	M	H	H	H	M	M	H	H	H
18NTE409T	Cancer Nanotechnology	H	M	H	H	H	M	M	H	H	M	M	M	H	H	H
18NTE410T	Vacuum and Thinfilm Technology	H	M	H	H	H	M	M	H	H	H	M	H	H	H	H
18NTE411T	Atomistic Modeling	H	H	H	H	H	H	M	H	M	H	M	H	H	H	H
18NTE412T	Societal Implications of Nanotechnology	H	M	H	H	H	H	H	M	M	M	M	H	H	H	H
18NTE413T	Nanotechnology In Tissue Engineering	H	M	H	H	H	M	M	H	H	H	M	M	H	H	H
18NTE414T	Nanomagnetism and Spintronics	H	H	H	H	H	H	M	H	M	H	H	H	H	H	H
18NTP101L	Massive Open Online Course - I	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18NTP102L	Industrial Training-I	H	M	M	M	M	M	M	H	H	H	M	H	H	H	H
18NTP103L	Seminar - I	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18NTP104L	Massive Open Online Course - II	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18NTP105L	Industrial Training-II	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18NTP106L	Seminar - II	H	M	M	M	M	M	M	M	H	H	H	M	H	H	H
18NTP107L	Minor Project	H	H	H	H	H	M	M	H	H	H	H	H	M	M	M

18NTP108L	Internship (4-6 weeks)	H	H	H	H	H	M	M	H	H	H	H	H	M	M
18NTP109L	Project	M	M	H	H	M	M	H	H	H	M	H	H	H	H
18NTP110L	Semester Internship	M	M	H	H	M	M	H	H	H	M	H	H	H	H
	Program Average	H	M	H	H	M	M	H	H	H	M	H	H	H	M

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

33. (g) Implementation Plan: B.Tech. in Nanotechnology

Semester - I					
Code	Course Title	Hours/ Week			C
		L	T	P	
18LEH101J	English	2	0	2	3
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18PYB103J	Physics: Semiconductor Physics	3	1	2	5
18MES101L	Engineering Graphics and Design	1	0	4	3
18EES101J	Basic Electrical and Electronics 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			C
		L	T	P	
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
18MES103L	Civil and Mechanical Engineering 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			C
		L	T	P	
18MAB203T	Probability and Stochastic Processes	3	1	0	4
18NTS101T	Nanoscience and Nanotechnology	3	0	0	3
18PYS201T	Materials Science	3	0	0	3
18NTC101T	Nanoscale Chemistry	3	0	0	3
18NTC102T	Quantum Mechanics for Nanotechnologists	3	0	0	3
18NTC103L	Nanoscale Materials Laboratory	0	0	2	1
18NTC104T	Thermodynamics and Statistical Mechanics	3	0	0	3
18PDH103T	Social Engineering	2	0	0	2
18PDM201L	Competencies in Social Skills	0	0	2	0
18PDM203L	Entrepreneurial Skill Development				
18CYM101T	Environmental Science				
Total Learning Credits					22

Semester - IV					
Code	Course Title	Hours/ Week			C
		L	T	P	
18MAB202T	Numerical Methods for Engineers	3	1	0	4
18BTB101T	Biology	2	0	0	2
18NTC105T	Biological Principles for Nanoscale Science	3	0	0	3
18NTC106T	Design and Synthesis of Nanomaterials	3	0	0	3
18NTC107J	Advanced Characterization of Nanomaterials	3	0	2	4
18NTC108T	Modeling and Computational Tools	3	0	0	3
18NTC109T	Solid State Engineering	3	0	0	3
18PDH102T	Management Principles for Engineers	2	0	0	2
18PDM202L	Critical and Creative Thinking Skills	0	0	2	0
18PDM204L	Business Basics for Entrepreneurs				
Total Learning Credits					24

Semester - V					
Code	Course Title	Hours/ Week			C
		L	T	P	
18MAB301T	Probability and Statistics	3	1	0	4
18NTC201T	Nanophotonics	3	0	0	3
18NTC202J	Nanobiotechnology	3	0	2	4
	Professional Elective – 1	3	0	0	3
	Professional Elective – 2	3	0	0	3
	Open Elective – 1	3	0	0	3
	Open Elective – 2	3	0	0	3
18NTP101L	Massive Open Online Course - I	0	0	2	1
18NTP102L	Industrial Training-I				
18NTP103L	Seminar - I				
18PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
18PDM302L	Entrepreneurship Management				
18LEM110L	Indian Art Form				
Total Learning Credits					24

Semester - VI					
Code	Course Title	Hours/ Week			C
		L	T	P	
18NTC203T	Nanotoxicology	3	0	0	3
18NTC204J	Nanoelectronics	3	0	2	4
18NTC205J	Micro and Nanofabrication	3	0	2	4
18NTC350T	Comprehension	0	1	0	1
	Professional Elective – 3	3	0	0	3
	Professional Elective – 4	3	0	0	3
	Open Elective – 3	3	0	0	3
18NTP104L	Massive Open Online Course - II	0	0	2	1
18NTP105L	Industrial Training-II				
18NTP106L	Seminar - II				
18PDH201T	Employability Skills and Practices	0	0	2	1
18LEM109T	Indian Traditional Knowledge	1	0	0	0
Total Learning Credits					23

Semester - VII					
Code	Course Title	Hours/ Week			C
		L	T	P	
18NTC301J	Polymer and Nanocomposites	3	0	2	4
	Professional Elective – 5	3	0	0	3
	Professional Elective – 6	3	0	0	3
	Open Elective – 4	3	0	0	3
18NTP107L	Minor Project	0	0	6	3
18NTP108L	Internship (4-6 weeks)				
Total Learning Credits					16

Semester - VIII					
Code	Course Title	Hours/ Week			C
		L	T	P	
18NTP109L	Project	0	0	20	10
18NTP110L	Semester Internship				
Total Learning Credits					10