

ACADEMIC CURRICULA
UNDERGRADUATE/ INTEGRATED
POST GRADUATE DEGREE
PROGRAMMES

(With exit option of Diploma)

(Choice Based Flexible Credit System)

Regulations 2021

Volume – 1

(Revised in July 2023)



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, Chengalpattu District 603203,
Tamil Nadu, India

12. B.Tech in Biomedical Engineering

12. (a) Mission of the Department

Mission Stmt – 1	<i>Build on a strong foundation in Basic science and Engineering and educate the students in diverse filed of Biomedical Engineering</i>
Mission Stmt – 2	<i>Work towards state of art Biomedical Engineering research and development through an interdisciplinary curriculum.</i>
Mission Stmt – 3	<i>Apply knowledge about design in development of enabling technologies for improvement of human health</i>

12. (b) Program Educational Objectives (PEO)

PEO – 1	<i>Develop real world biomedical devices and prototype models and test with multi-disciplinary approach.</i>
PEO – 2	<i>Design technologically enabled equipments that open up new areas of medical research.</i>
PEO – 3	<i>To impose innovative ideas for commercialization of developed products.</i>
PEO – 4	<i>Lead and work in a team with varied expertise and meet the changing needs of the profession through life long learning.</i>
PEO – 5	<i>To promote entrepreneurship skills in creating jobs in health care domain.</i>

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

	Mission Stmt – 1	Mission Stmt – 2	Mission Stmt – 3
PEO – 1	3	2	3
PEO – 2	3	3	2
PEO – 3	3	2	3
PEO – 4	3	3	2
PEO – 5	3	3	2

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

	Program Outcomes (PO)												PSO		
	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
PEO – 1	3	3	3	3	2	3	3	2	3	2	3	2	3	3	3
PEO – 2	3	2	3	3	3	2	2	2	3	2	3	3	3	3	3
PEO – 3	3	3	3	3	2	3	3	3	2	3	3	2	2	3	3
PEO – 4	2	3	3	3	2	2	2	2	3	2	3	2	3	2	3
PEO – 5	3	2	2	3	2	2	2	2	2	2	2	3	3	2	2

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

PSO – Program Specific Outcomes

PSO - 1	<i>Ability to apply engineering design to offer health care solutions with consideration of safety, welfare, social, cultural and environmental factors</i>
PSO - 2	<i>Ability to model and analyze biological systems with ethical and professional responsibilities in Engineering situations.</i>
PSO - 3	<i>Ability to initiate cross disciplinary and industry collaborative research.</i>

12. (e) Program Structure: B.Tech. in Biomedical Engineering

Humanities & Social Sciences including Management Courses (H)				
Course Code	Course Title	Hours/Week		
		L	T	P
21LEH101T	Communicative English	2	1	0
21LEH102T	Chinese			
21LEH103T	French			
21LEH104T	German			
21LEH105T	Japanese	2	1	0
21LEH106T	Korean			
21LEH107T	Spanish			
21GNH101J	Philosophy of Engineering	1	0	2
21PDH201T	Social Engineering	2	0	0
21GNH401T	Behavioral Psychology	2	1	0
Total Credits				13
Engineering Science Courses (S)				
Course Code	Course Title	Hours/Week		
		L	T	P
21CSS101J	Programming for Problem Solving	3	0	2
21MES101L	Basic civil and Mechanical Workshop	0	0	4
21MES102L	Engineering Graphics and Design	0	0	4
21EES101T	Electrical and Electronics Engineering	3	1	0
21DCS201P	Design Thinking and Methodology	1	0	4
21PYS202T	Medical Physics	3	0	0
21CSS303T	Data science	1	1	0
Total Credits				20
Professional Elective Courses (E) (Any 6 Courses)				
Course Code	Course Title	Hours/Week		
		L	T	P
21BME261T	Biophotonics and Bioimaging	3	0	0
21BME262T	Home Medicare Technology	3	0	0
21BME263T	Biomedical Laser Instruments	3	0	0
21BME264T	Artificial Organs and Tissue engineering	3	0	0
21BME265T	Biomedical Nano Technology	3	0	0
21BME266T	Biometrics	3	0	0
21BME361T	BioMEMS	3	0	0
21BME362T	Human Electrophysiology	3	0	0
21BME363T	Biomedical device design Fundamentals	3	0	0
21BME364T	Innovation, Translation and Entrepreneurship	3	0	0
21BME365T	Hospital Management system	3	0	0
21BME366T	Trouble shooting of Medical Devices	3	0	0
21BME367T	Quality Assurance and regulatory aspects for medical devices	3	0	0
21BME368T	Neuroengineering	3	0	0
21BME369T	IoT and Telehealth Technology	3	0	0
21BME370T	Micro fluidics	3	0	0
21BME371T	Medical Ethics and Intellectual Property Rights	3	0	0
21BME372T	Virtual Instrumentation for Biomedical Engineers	3	0	0
21BME373T	Health Care Data Analytics	3	0	0
21BME461T	Biomedical Informatics	3	0	0
21BME462T	Physiological Modeling	3	0	0
21BME463T	Biomimetics	3	0	0
21BME464T	Neural Networks and Genetic Algorithms	3	0	0
21BME465T	Wearable Systems and Mobile Health Care	3	0	0
21BME466T	Artificial Intelligence in Health Care	3	0	0
21BME467T	Bio inspired Robotics	3	0	0
21BME468T	Computational Tools in Bioengineering and Biomedicine	3	0	0
21BME469T	Neuro Rehabilitation and Human Machine Interface	3	0	0
21BME470T	Assistive and Augmentative Technologies	3	0	0
21BME471T	Machine Learning and Deep learning techniques in medicine	3	0	0
21BME472T	Virtual Reality in Health Care	3	0	0
Total Credits				18
Mandatory Courses (M)				
Course Code	Course Title	Hours/Week		
		L	T	P
21PDM101L	Professional Skills and Practices	0	0	2
21CYM101T	Environmental Science	1	0	0
21PDM102L	General Aptitude	0	0	2
21LEM101T	Constitution of India	1	0	0
21LEM102T	Universal Human Values – Introduction	1	0	0
Basic Science Courses (B)				
Course Code	Course Title	Hours/Week		
		L	T	P
21MAB101T	Calculus and Linear Algebra	3	1	0
21CYB101J	Chemistry	3	1	2
21BTB104T	Biology -Human Physiology and Anatomy	2	0	0
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2
21MAB201T	Transforms and Boundary Value Problems	3	1	0
21MAB202T	Numerical Methods	3	1	0
21MAB301T	Probability and Statistics	3	1	0
Total Credits				32
Professional Core Courses (C)				
Course Code	Course Title	Hours/Week		
		L	T	P
21BMC101J	Biomedical Sensors	2	0	2
21BMC202T	Biomedical Signals and Systems	3	0	0
21BMC203J	Electric and Electronic Circuits	3	0	2
21BMC204J	Digital Logic for Medical Systems	2	0	2
21BMC205J	Integrated Circuit Design for Bioinstrumentation	2	0	2
21BMC206J	Biomedical Instrumentation	3	0	2
21BMC207J	Biomaterials and Tissue Interaction	2	0	2
21BMC301J	Biomedical Signal Processing	3	0	2
21BMC302J	Microcontrollers and its Application in Medicine	3	0	2
21BMC303T	Principles of Medical Imaging	3	0	0
21BMC304J	Medical Image Processing	2	0	2
21BMC305T	Biocontrol Systems	3	0	0
21BMC401J	Biomechanics	2	0	2
21BMC402J	Biomedical Equipments for Clinical Applications	2	0	2
21CSC206T	Artificial Intelligence	2	1	0
Total Credits				49
Open Elective Courses (O) (Any 3 Courses)				
Course Code	Course Title	Hours/Week		
		L	T	P
21BMO121T	Fundamentals of Biomedical Engineering	3	0	0
21BMO122T	Health Information Systems	3	0	0
21BMO123T	Basics of Medical Imaging	3	0	0
21BMO124T	Rehabilitation Engineering	3	0	0
21BMO125T	Quality control for biomedical devices	3	0	0
21BMO126T	Biomechanics of Human Movement	3	0	0
21BMO127T	Digital healthcare Technology	3	0	0
Total Credits				9
Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)				
Course Code	Course Title	Hours/Week		
		L	T	P
21GNP301L	Community Connect	0	0	2
21BMP303T	MOOC	3	0	0
21BMP302L	Project	0	0	6
21BMP401L	Major Project	0	0	30
21BMP402L	Major Project	0	0	20
21BMP403L	Internship	0	0	10
Total Credits				19
Mandatory Courses (M)				
Course Code	Course Title	Hours/Week		
		L	T	P
21LEM201T	Professional Ethics	1	0	0
21PDM201L	Verbal Reasoning	0	0	2
21PDM202L	Critical and Creative Thinking Skills	0	0	2
21PDM301L	Analytical and Logical Thinking Skills	0	0	2
21PDM302L	Employability Skills and Practices	0	0	2
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0
21LEM301T	Indian Art Form	1	0	0
21LEM302T	Indian Traditional Knowledge	1	0	0
21GNM101L	Physical and Mental Health using Yoga	0	0	2
21GNM102L	NSS	0	0	2
21GNM103L	NCC	0	0	2
21GNM104L	NSO	0	0	2
Total Credits				3

12. (f) Program Articulation: B.Tech. in Biomedical Engineering

Course Code	Course Name	Program Outcomes (PO)												PSO		
		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
21BMC101J	Biomedical sensors	1	1	1	1	-	-	-	-	-	-	-	-	1	1	1
21BMC202T	Biomedical signals and systems	2	1	1	1	-	-	-	-	-	-	-	-	1	1	2
21BMC203J	Electric and Electronic circuits	3	1	1	1	-	-	-	-	-	-	1	-	2	1	-
21BMC204J	Digital logic for Medical systems	1	2	1	1	1	-	-	-	-	-	-	1	1	1	1
21BMC205J	Integrated circuit Design for Bioinstrumentation	1	1	1	1	1	-	-	-	-	-	-	1	1	1	1
21BMC206J	Biomedical Instrumentation	2	1	-	1	2	1	-	-	-	-	-	-	1	1	1
21BMC207J	Biomaterials and Tissue Interaction	1	-	-	-	-	-	-	2	-	-	-	-	1	1	1
21BMC301J	Biomedical signal processing	2	1	1	1	1	-	-	-	-	-	-	-	1	-	1
21BMC302J	Microcontrollers and its application in medicine	2	-	1	-	1	-	-	-	-	-	-	-	1	-	1
21BMC303T	Principles of medical imaging	1	1	-	1	1	-	-	-	-	-	-	-	1	1	-
21BMC304J	Medical image processing	3	1	1	1	2	-	-	-	-	-	-	-	1	-	1
21BMC305T	Biocontrol systems	2	1	-	2	-	-	-	-	-	-	-	-	1	1	1
21BMC401J	Biomechanics	2	1	-	1	1	-	-	-	-	-	-	-	1	1	1
21BMC402J	Biomedical equipments for clinical applications	2	1	1	-	-	-	-	-	1	-	-	1	1	1	-
21BME261T	Biophotonics and Bioimaging	1	-	1	2	-	-	-	-	-	-	-	-	1	1	-
21BME262T	Home Medicare Technology	2	-	1	-	-	-	-	-	-	-	-	-	1	-	1
21BME263T	Biomedical Laser Instruments	1	-	2	1	-	-	-	-	-	-	-	-	1	1	-
21BME264T	Artificial Organs and Tissue engineering	2	-	1	-	-	-	-	1	-	-	-	1	1	1	1
21BME265T	Biomedical Nano Technology	2	-	-	-	-	-	-	-	-	-	-	1	1	1	1
21BME266T	Biometrics	2	-	1	1	-	-	-	-	1	-	-	-	1	1	1
21BME361T	BioMEMS	1	-	1	1	2	-	-	-	-	-	-	-	1	1	-
21BME362T	Human Electrophysiology	1	1	1	2	1	-	-	-	-	-	-	-	1	1	1
21BME363T	Biomedical device design Fundamentals	2	-	-	1	-	-	-	-	-	-	-	1	1	1	1
21BME364T	Innovation, Translation and Entrepreneurship	1	1	1	1	1	-	1	-	1	-	-	-	1	-	1
21BME365T	Hospital Management system	2	-	-	-	-	-	-	-	-	-	-	1	1	-	1
21BME366T	Trouble shooting of Medical Devices	2	1	1	1	-	-	-	-	-	-	-	-	1	1	-
21BME367T	Quality Assurance and regulatory aspects for medical devices	1	1	1	1	1	-	1	1	-	-	1	1	1	1	-
21BME368T	Neuroengineering	2	-	-	1	1	-	-	-	-	-	-	-	1	1	1
21BME369T	IOT and Telehealth Technology	3	1	2	1	-	-	-	-	-	-	-	-	2	-	-
21BME370T	Micro fluidics	2	1	1	2	1	-	-	-	-	-	-	1	1	1	-
21BME371T	Medical Ethics and Intellectual property rights	1	-	-	-	-	2	-	1	-	-	-	1	1	1	1
21BME372T	Virtual Instrumentation for Biomedical Engineers	3	1	1	1	-	-	-	-	-	-	-	-	2	2	1
21BME373T	Health care data analytics	3	2	1	2	1	2	2	2	1	1	2	2	1	2	2
21BME461T	Biomedical Informatics	1	-	1	1	1	1	-	-	-	-	-	-	1	1	1
21BME462T	Physiological Modeling	1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
21BME463T	Biomimetics	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
21BME464T	Neural Networks and Genetic Algorithms	2	1	1	-	-	-	-	-	-	-	-	1	1	1	-
21BME465T	Wearable systems and mobile health care	1	1	1	1	1	1	-	-	-	-	-	-	1	1	1
21BME466T	Artificial Intelligence in Health care	1	-	1	1	1	-	-	-	-	-	-	-	1	-	1
21BME467T	Bio inspired Robotics	2	1	1	-	1	-	-	-	-	-	-	1	1	1	-
21BME468T	Computational tools in Bioengineering and Biomedicine	2	-	-	1	-	-	-	-	-	-	-	2	1	1	1
21BME469T	Neuro rehabilitation and Human machine interface	3	-	2	2	-	-	-	-	-	-	-	1	1	1	-
21BME470T	Assistive and Augmentative Technologies	1	1	1	-	1	-	1	-	-	-	-	1	1	1	1
21BME471T	Machine learning and Deep learning techniques in medicine	1	1	1	1	1	-	-	-	-	-	-	1	1	1	-
21BME472T	Virtual Reality in Health care	3	1	1	2	-	-	-	-	-	-	-	-	2	1	-
21BMO121T	Fundamentals of Biomedical Engineering	2	-	1	-	-	-	-	-	-	-	-	-	1	1	-
21BMO122T	Health Information Systems	1	1	1	-	1	-	-	1	-	-	-	1	1	-	1
21BMO123T	Basics of Medical Imaging	1	1	-	1	-	1	-	-	-	-	-	-	1	-	-
21BMO124T	Rehabilitation Engineering	1	1	1	1	1	1	-	-	-	-	-	-	1	1	1
21BMO125T	Quality control for biomedical devices	-	1	-	1	-	-	-	-	-	-	2	-	1	1	-
21BMO126T	Biomechanics of Human Movement	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-
21BMO127T	Digital healthcare Technology	1	-	1	-	-	-	-	-	-	-	1	-	1	1	-
	Program Average	1.6	1.1	1.1	1.2	1.1	1.3	1.1	1.2	1.1	1.1	1.4	1.1	1.1	1.1	1.1

12. (g) Implementation Plan: B.Tech. in Biomedical Engineering

Semester – I					
Code	Course Title	Hours/ Week			C
		L	T	P	
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
21BMC101J	Biomedical Sensors	2	0	2	3
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					21

Semester – II					
Code	Course Title	Hours/ Week			C
		L	T	P	
21LEH102T	Chinese	2	1	0	3
21LEH103T	French				
21LEH104T	German				
21LEH105T	Japanese				
21LEH106T	Korean				
21LEH107T	Spanish				
21GNH101J	Philosophy of Engineering				
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
21CYB101J	Chemistry	3	1	2	5
21CSS101J	Programming for Problem Solving	3	0	2	4
21BTB104T	Biology-Human Physiology and Anatomy	2	0	0	2
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	NSS				
21GNM103L	NCC				
21GNM104L	NSO				
Total Credits					22

Semester – III					
Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4
21BMC202T	Biomedical Signals and Systems	3	0	0	3
21BMC203J	Electric and Electronic Circuits	3	0	2	4
21BMC204J	Digital Logic for Medical Systems	2	0	2	3
21PDH201T	Social Engineering	2	0	0	2
21PYS202T	Medical Physics	3	0	0	3
21LEM201T	Professional Ethics	1	0	0	0
21PDM201L	Verbal Reasoning	0	0	2	0
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
Total Credits					22

Semester – IV					
Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB202T	Numerical Methods	3	1	0	4
21CSE206T	Artificial Intelligence	2	1	0	3
21BMC205J	Integrated Circuit Design for Bioinstrumentation	2	0	2	3
21BMC206J	Biomedical Instrumentation	3	0	2	4
21BMC207J	Biomaterials and Tissue Interaction	2	0	2	3
E	Professional Elective – I				3
21DCS201P	Design Thinking and Methodology	1	0	4	3
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0
Total Credits					23

Semester – V					
Code	Course Title	Hours/ Week			C
		L	T	P	
21MAB301T	Probability and Statistics	3	1	0	4
21BMC301J	Biomedical Signal Processing	3	0	2	4
21BMC302J	Microcontrollers and its Application in Medicine	3	0	2	4
21BMC303T	Principles of Medical Imaging	3	0	0	3
E	Professional Elective – II				3
O	Open Elective – I				3
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0
21LEM301T	Indian Art Form	1	0	0	0
21GNP301L	Community Connect	0	0	2	1
Total Credits					22

Semester – VI					
Code	Course Title	Hours/ Week			C
		L	T	P	
21CSS303T	Data Science	1	1	0	2
21BMC304J	Medical Image Processing	2	0	2	3
21BMC305T	Biocontrol Systems	3	0	0	3
E	Professional Elective – III				3
E	Professional Elective – IV				3
21BMP303T	MOOC	3	0	0	3
21BMP302L	Project	0	0	6	
O	Open Elective – II				3
21PDM302L	Employability Skills and Practices	0	0	2	0
21LEM302T	Indian Traditional Knowledge	1	0	0	0
Total Credits					20

Semester – VII					
Code	Course Title	Hours/ Week			C
		L	T	P	
21GNH401T	Behavioral Psychology	2	0	2	3
E	Professional Elective – V				3
E	Professional Elective – VI				3
21BMC401J	Biomechanics	2	0	2	3
21BMC402J	Biomedical Equipments for Clinical Applications	2	0	2	3
O	Open Elective – III				3
Total Credits					18

Semester – VIII					
Code	Course Title	Hours/ Week			C
		L	T	P	
21BMP401L	Major Project	0	0	30	15
21BMP402L	Major Project	0	0	20	
21BMP403L	Internship#	0	0	10	
Total Credits					15

#Students have to register either 21BMP401L or 21BMP402L and 21BMP403L both in eighth semester