

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

13. B.Tech in Biomedical Engineering with Specialization in Machine Intelligence

13. (a) Mission of the Department

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

13. (b) Program Educational Objectives (PEO)

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

13. (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

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

13. (e) Program Structure: B.Tech. in Biomedical Engineering with Specialization in Machine Intelligence

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						
21LEH103T	French						
21LEH104T	German						
21LEH105T	Japanese	2	1	0	3		
21LEH106T	Korean						
21LEH107T	Spanish						
21GNH101J	Philosophy of Engineering	1	0	2	2		
21PDH201T	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	Basic civil and Mechanical Workshop	0	0	4	2		
21MES102L	Engineering Graphics and Design	0	0	4	2		
21EES101T	Electrical and Electronics Engineering	3	1	0	4		
21DCS201P	Design Thinking and Methodology	1	0	4	3		
21PYS202T	Medical Physics	3	0	0	3		
21CSS303T	Data science	1	1	0	2		
Total Credits					20		

Professional Elective Courses (E) (Any 6 Courses)							
Course Code	Course Title	Hours/Week					
		L	T	P	C		
21BME271T	AI and Machine learning for Healthcare	3	0	0	3		
21BME272T	Statistics and Data Science	3	0	0	3		
21BME273T	Artificial Neural Networks and Pattern Recognition	3	0	0	3		
21BME274T	IoT and Smart Sensors	3	0	0	3		
21BME275T	Telehealth Care Informatics	3	0	0	3		
21BME276T	Natural Language Processing for Healthcare Applications	3	0	0	3		
21BME381T	Deep Learning Techniques in Medicine	3	0	0	3		
21BME382T	Computer Vision and Image Processing	3	0	0	3		
21BME383T	Robotics and Smart Technologies	3	0	0	3		
21BME384T	Brain Computer Interface	3	0	0	3		
21BME481T	Biomimetics and Bio-inspired Design	3	0	0	3		
21BME482T	Biomechanical Modeling and Simulation	3	0	0	3		
Total Credits					18		

Mandatory Courses (M)							
Course Code	Course Title	Hours/Week					
		L	T	P	C		
21PDM101L	Professional Skills and Practices	0	0	2	0		
21CYM101T	Environmental Science	1	0	0	0		
21PDM102L	General Aptitude	0	0	2	0		
21LEM201T	Professional Ethics	1	0	0	0		
21PDM201L	Verbal Reasoning	0	0	2	0		
21PDM202L	Critical and Creative Thinking Skills	0	0	2	0		
21PDM301L	Analytical and Logical Thinking Skills	0	0	2	0		
21PDM302L	Employability Skills and Practices	0	0	2	0		
21LEM101T	Constitution of India	1	0	0	0		
21LEM102T	Universal Human Values – Introduction	1	0	0	0		
21LEM202T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3		
21LEM301T	Indian Art Form	1	0	0	0		
21LEM302T	Indian Traditional Knowledge	1	0	0	0		
21GNM101L	Physical and Mental Health using Yoga	0	0	2	0		
21GNM102L	NSS	0	0	2	0		
21GNM103L	NCC	0	0	2	0		
21GNM104L	NSO	0	0	2	0		
Total Credits					3		

Basic Science Courses (B)							
Course Code	Course Title	Hours/Week					
		L	T	P	C		
21MAB101T	Calculus and Linear Algebra	3	1	0	4		
21CYB101J	Chemistry	3	1	2	5		
21BTB104T	Biology -Human Physiology and Anatomy	2	0	0	2		
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4		
21PYB101J	Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics	3	1	2	5		
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4		
21MAB202T	Numerical Methods	3	1	0	4		
21MAB301T	Probability and Statistics	3	1	0	4		
Total Credits					32		

Professional Core Courses (C)							
Course Code	Course Title	Hours/Week					
		L	T	P	C		
21BMC101J	Biomedical Sensors	2	0	2	3		
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		
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		
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		
21BMC304J	Medical Image Processing	2	0	2	3		
21BMC305T	Biocontrol Systems	3	0	0	3		
21BMC401J	Biomechanics	2	0	2	3		
21BMC402J	Biomedical Equipments for Clinical Applications	2	0	2	3		
21CSC206T	Artificial Intelligence	2	1	0	3		
Total Credits					49		

Open Elective Courses (O) (Any 3 Courses)							
Course Code	Course Title	Hours/Week					
		L	T	P	C		
21BMO121T	Fundamentals of Biomedical Engineering	3	0	0	3		
21BMO122T	Health Information Systems	3	0	0	3		
21BMO123T	Basics of Medical Imaging	3	0	0	3		
21BMO124T	Rehabilitation Engineering	3	0	0	3		
21BMO125T	Quality Control for Biomedical Devices	3	0	0	3		
21BMO126T	Biomechanics of Human Movement	3	0	0	3		
21BMO127T	Digital Healthcare Technology	3	0	0	3		
Total Credits					9		

Project Work, Seminar, Internship In Industry / Higher Technical Institutions (P)							
Course Code	Course Title	Hours/Week					
		L	T	P	C		
21GNP301L	Community Connect	0	0	2	1		
21BMP303T	MOOC	3	0	0	3		
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		

13. (f) Program Articulation: B.Tech. in Biomedical Engineering with Specialization in Machine Intelligence

Course Code	Course Name	Program Learning Outcomes (PLO)														
		Graduate Attributes												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	1
21BMC205J	Integrated circuit Design for Bioinstrumentation	1	1	1	1	1	-	-	-	-	-	1	1	1	1	1
21BMC206J	Biomedical Instrumentation	2	1	-	1	2	1	-	-	-	-	-	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	-	
21BME271T	AI and Machine learning for healthcare															
21BME272T	Statistics and Data science															
21BME273T	Artificial Neural Networks and Pattern Recognition															
21BME274T	IOT and Smart Sensors															
21BME275T	Telehealth care Informatics															
21BME276T	Natural language processing for healthcare applications															
21BME381T	Deep learning Techniques in Medicine															
21BME382T	Computer vision and Image Processing															
21BME383T	Robotics and Smart Technologies															
21BME384T	Brain computer Interface															
21BME481T	Biomimetics and Bio-inspired Design															
21BME482T	Biomechanical modeling and Simulation															
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															

13. (g) Implementation Plan: B.Tech. in Biomedical Engineering with Specialization in Machine Intelligence

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