

ACADEMIC CURRICULA
UNDERGRADUATE/ INTEGRATED
POST GRADUATE DEGREE
PROGRAMMES

(With exit option of Diploma)

(Choice Based Flexible Credit System)

Regulations 2021

Volume – 1

(Revised on July 2024)



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

54. Integrated M.Tech. in Materials Science & Engineering

54. (a) Mission of the Department

Mission Stmt – 1	Actively contribute for the development of materials science, 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 materials science and engineering.
Mission Stmt – 5	Focus on developing skills of students to enhance the employability in various organizations

54. (b) Program Educational Objectives (PEO)

PEO – 1	Provide understanding of structures and properties, i.e., physical, chemical and biological properties of materials
PEO – 2	Develop skills on the synthesis of various materials ranging from glass, ceramics to metals to polymers to different composites
PEO – 3	Familiarize the graduates with the advanced micro and nano-scale characterization techniques for optical, electrical, mechanical characterization and also develop a keen knowledge about various computational tools for design, synthesis and characterization of materials
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

54. (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	3	2	1	3	1
PEO - 2	3	3	2	3	2
PEO - 3	3	3	2	3	2
PEO - 4	3	2	3	2	3
PEO - 5	2	3	3	1	2

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

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

	Program Outcomes (PO)												Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2	PSO-3
	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			
PEO - 1	3	3	3	3	3	1	2	2	3	3	3	3	3	3	3
PEO - 2	3	3	3	3	3	1	2	3	3	3	3	3	3	3	3
PEO - 3	3	3	3	3	3	2	2	3	3	3	2	3	3	3	3
PEO - 4	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
PEO - 5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

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

PSO – Program Specific Outcomes (PSO)

PSO - 1	Ability to understand the properties and behaviour of materials across the size and dimension.
PSO - 2	Ability to apply, Analyse and evaluate the learnt principles
PSO - 3	Ability to employ the learnt skills to benefit of self, science and society.

54. (e) Program Structure: Integrated M.Tech. in Materials Science & Engineering

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						
21LEH108T	Russian						
21GNH101J	Philosophy of Engineering	1	0	2	2		
21PDH209T ¹	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		
21EES101T	Electrical and Electronics Engineering	3	1	0	4		
21MES101L ¹	Basic Civil and Mechanical Workshop	0	0	4	2		
21MES102L ¹	Engineering Graphics and Design	0	0	4	2		
21CSS101J	Programming for Problem Solving	3	0	2	4		
21NTS211T	Computational Methods for Materials Science	3	0	0	3		
21DCS201P ¹	Design Thinking and Methodology	1	2	0	3		
21CSS303T	Data Science	2	0	0	2		
Total Credits 20							

Project Work, Seminar, Internship in Industry / Higher Technical Institutions (P)							
Course Code	Course Title	Hours / Week					
		L	T	P	C		
21GNP301L ¹	Community Connect	0	0	2	1		
21NTP302L ¹	Project	0	0	6			
21NTP303T ¹	MOOC	3	0	0	3		
21NTP401L	Major Project	0	0	30	15		
21NTP402L	Major Project	0	0	20	10		
21NTP403L	Internship#	0	0	10	5		
21NTP501L	Specialization Project	0	0	40	20		
21NTP502L	Specialization Project	0	0	30	15		
21NTP503L	Domain Internship	0	0	10	5		
Total Credits 39							

Open Elective Courses (O) (Any 4 courses)							
Course Code	Course Title	Hours / Week					
		L	T	P	C		
21NTO314T	Energy Materials	3	0	0	3		
21NTO315T	Nano-composites	3	0	0	3		
21NTO407T	Quantum Computing	3	0	0	3		
21NTO511T	Materials Processing and Design	3	0	0	3		
Total Credits 12							

Basic Science Courses (B)							
Course Code	Course Title	Hours / Week					
		L	T	P	C		
21PYB102J	Semiconductor Physics and Computational Methods	3	1	2	5		
21CYB101J	Chemistry	3	1	2	5		
21MAB101T	Calculus and Linear Algebra	3	1	0	4		
21MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4		
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4		
21MAB202T	Numerical methods	3	1	0	4		
21MAB203T	Probability and Stochastic Processes	3	1	0	4		
21BTB103T	Biology	2	0	0	2		
Total Credits 32							

Professional Core Courses (C)							
Course Code	Course Title	Hours / Week					
		L	T	P	C		
21NTC111T	Physics of Materials	3	0	0	3		
21NTC211J	Electric, Electronic and Dielectric properties of materials	3	0	2	4		
21NTC212T	Engineering Thermodynamics	3	0	0	3		
21NTC213T ²	Kinetic, Diffusion and Mass Transfer	3	0	0	3		
21CSC206T	Artificial Intelligence	2	1	0	3		
21NTC214J ²	Optical and Photonic Properties of Materials	3	0	2	4		
21NTC215J	Physical Metallurgy	3	0	2	4		
21NTC216T	Polymer Materials and Composites	3	0	0	3		
21NTC311L ¹	Materials characterization Laboratory	0	0	6	3		
21NTC312T	Mechanical Behavior of Materials	3	0	0	3		
21NTC313T ²	Electrochemistry and Corrosion	3	1	0	4		
21NTC315J ²	Magnetism and Magnetic Materials	2	0	2	3		
21NTC316T	Glass and Ceramics materials	3	0	0	3		
21NTC411L ¹	Nanoindentation and Nanotribology	0	0	6	3		
21NTC412T ²	Soft Matter	3	0	0	3		
21NTC413T ²	Alloys: Ferrous and Non-ferrous	3	1	0	4		
21NTC414T	Engineering Biomaterials	3	1	0	4		
21IPC501J ²	Research Methodology	2	1	2	4		
Total Credits 61							

Non Credit Courses (M)							
Course Code	Course Title	Hours / Week					
		L	T	P	C		
21PDM101L ¹	Professional Skills and Practices	0	0	2	0		
21PDM102L ¹	General Aptitude	0	0	2			
21PDM201L ¹	Verbal Reasoning	0	0	2			
21PDM202L ¹	Critical and Creative Thinking Skills	0	0	2			
21PDM301L ¹	Analytical and Logical Thinking Skills	0	0	2			
21PDM302L ¹	Employability Skills and Practices	0	0	2			
21CYM101T ¹	Environmental Science	1	0	0		0	
21LEM101T ¹	Constitution of India	1	0	0		0	
21LEM102T ¹	Universal Human Values – Introduction	1	0	0		0	
21LEM201T ¹	Professional Ethics	1	0	0		0	
21LEM202T ¹	Universal Human Values-II: Understanding Harmony and Ethical Human Conduct	2	1	0	3		
21LEM301T ¹	Indian Art Form	1	0	0	0		
21LEM302T ¹	Indian Traditional Knowledge	1	0	0	0		
21GNM101L ¹	Physical and Mental Health using Yoga	0	0	2	0		
21GNM102L ¹	National Service Scheme						
21GNM103L ¹	National Cadet Corps						
21GNM104L ¹	National Sports Organization						
Total Credits 03							

Professional Elective Courses (E) (Any 11 courses)						Professional Elective Courses (E)					
Course Code	Course Title	Hours / Week			C	Course Code	Course Title	Hours / Week			C
		L	T	P				L	T	P	
21NTE221T	Concept of Nanoscience for Engineers	3	0	0	3	21NTE425T	Micro and Nanofluids	3	0	0	3
21NTE222T	Synthesis of Nanostructured Materials	3	0	0	3	21NTE520T	MEMS and NEMS	3	0	0	3
21NTE321T	Advanced Drug Delivery Systems	3	0	0	3	21NTE521T	2D Layered Materials	3	0	0	3
21NTE322P ¹	Vacuum and Thin Film Technology	2	1	0	3	21NTE522T	Functional Materials	3	0	0	3
21NTE323T	Additive Manufacturing techniques	3	0	0	3	21NTE523T	Materials Under Extreme Temperature	3	0	0	3
21NTE324T	Physics of Electronic Materials	3	0	0	3	21NTE524T	Micro and Nano Processing of Materials	3	0	0	3
21NTE325T	Physics of Solid State Devices	3	0	0	3	21NTE525T	Smart Engineering Materials	3	0	0	3
21NTE326T	Molecular Spectroscopy and it's Applications	3	0	0	3	21NTE526P ¹	Nano Fabrications	2	1	0	3
21NTE327T	Nanocatalysts	3	0	0	3	21NTE527T	Biocomposites	3	0	0	3
21NTE421T	Surface Engineering	3	0	0	3	21NTE528T	Atomistic Modeling	3	0	0	3
21NTE422T	Microelectronics and VLSI	3	0	0	3	21NTE529T	Defects in Materials	3	0	0	3
21NTE424T	Sensors and Transducers	3	0	0	3	Total Credits					33



54. (f) Programme Articulation: Integrated M.Tech. in Materials Science & Engineering

Course Code	Course Name	Program Outcomes (PO)												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
		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
21NTC111T	Physics of Materials	-	3	-	3	-	-	-	-	-	-	-	-	-	-	-
21NTC211J	Electric, Electronics and Dielectric Properties of Materials	3	2	-	2	-	-	-	-	-	-	-	-	3	3	3
21NTC212T	Engineering Thermodynamics	3	2.33	-	-	-	-	-	-	-	-	-	-	2.75	3	3
21NTC213T	Kinetic, Diffusion and Mass Transfer	2	2	-	3	-	-	-	-	-	-	-	-	3	-	3
21NTC214J	Optical and Photonic Properties of Materials	2.8	2.4	-	-	-	-	-	-	-	-	-	-	3	2	2.7
21NTC215J	Physical Metallurgy	2.5	2	3	2.67	2	-	-	-	-	-	-	-	3	2.33	3
21NTC216T	Polymer Materials	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
21NTC311L	Materials characterization Laboratory	3	3	-	-	-	-	-	-	-	-	-	-	2.5	2.5	3
21NTC312T	Mechanical Behavior of Materials	3	3	-	-	-	-	-	-	-	-	-	-	3	3	2.75
21NTC313T	Electrochemistry and Corrosion	3	2	2	-	-	-	-	-	-	-	-	-	3	3	3
21NTC315J	Magnetism and Magnetic Materials	2.83	2	3	2.33	-	-	-	-	-	-	-	-	2.5	2	3
21NTC316T	Glass and Ceramics materials	2.5	2	3	2.33	-	-	-	-	-	-	-	-	2.5	-	-
21NTC411L	Nanoindentation and Nanotribology	3	-	3	-	3	-	-	-	-	-	-	-	-	3	-
21NTC412T	Soft Matter	2.5	2.5	1	-	-	-	-	-	-	-	-	-	2	2	-
21NTC413T	Alloys: Ferrous and Non-ferrous	3	3	3	3	2	-	-	-	-	-	-	-	3	2	-
21NTC414T	Engineering Biomaterials	3	2	1.67	-	-	-	-	-	-	-	-	-	2	2	-
21NTP401L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTP402L	Major Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTP501L	Specialization Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTP502L	Domine Internship	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21NTE221T	Concept of Nanoscience for engineers	3	2	2	-	1	-	-	-	-	-	-	-	3	-	2
21NTE222T	Synthesis of Nanostructured Materials	2.8	2	2	2	-	-	-	-	-	-	-	-	2	2	-
21NTE321T	Advanced Drug Delivery Systems	3	2	1.67	-	-	-	-	-	-	-	-	-	2	2	-
21NTE322P	Vacuum and thin film technology	2.4	2	2.5	-	-	-	-	-	-	-	-	-	2	2	-
21NTE323T	Additive Manufacturing techniques	3	-	3	-	-	-	-	-	-	-	-	-	2	-	-
21NTE324T	Physics of Electronic Materials	2.6	2.4	-	2.4	-	-	-	-	2	-	-	-	2.75	-	-
21NTE325T	Physics of solid state devices	2.8	2	-	3	-	-	-	-	-	-	-	-	2	2.5	-
21NTE326T	Molecular spectroscopy and it's applications	3	2.5	-	3	-	-	-	-	-	-	-	-	2.5	2	3
21NTE327T	Nanocatalysts	2.5	2.33	1	3	-	-	3	-	-	-	-	-	2.5	-	-
21NTE421T	Surface Engineering	3	2	2	-	-	-	-	-	-	-	-	-	2.67	2	3
21NTE422T	Microelectronics and VLSI	2.6	-	-	2.4	-	-	-	-	-	-	-	-	3	-	-
21NTE424T	Sensors and transducers	3	2	2	2	-	-	-	-	-	-	-	-	3	-	-
21NTE425T	Micro and Nanofluids	2.8	2.2	-	-	-	-	-	-	-	-	-	-	3	2.33	2.5
21NTE520T	MEMS and NEMS	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
21NTE521T	2D layered materials	2.75	2	2.5	2.5	-	-	-	-	-	-	-	-	2	2	-
21NTE522T	Functional Materials	2.75	2	2.5	2.5	-	-	-	-	-	-	-	-	2	2	-
21NTE523T	Materials under extreme temperature	2.5	2.3	1	3	-	-	-	-	-	-	-	-	2	2	-
21NTE524T	Micro and Nano processing of materials	3	-	3	3	3	-	-	-	-	-	-	-	3	2	-
21NTE525T	Smart Engineering Materials	2.4	2	-	2.75	-	-	-	-	-	-	-	-	3	-	-
21NTE526P	Nano fabrications	3	2	2	-	-	-	-	-	-	-	-	-	2.33	2.5	-
21NTE527T	Biocomposites	3	2	1.67	-	-	-	-	-	-	-	-	-	2	2	-
21NTE528T	Atomistic Modeling	3	3	3	3	2	-	-	-	-	-	-	-	3	2	-
21NTE529T	Defects in Materials	2	-	-	3	2	-	-	-	-	-	-	-	3	2	-
21NTO311T	Energy Materials	3	3	-	-	3	-	-	-	-	-	-	-	2	2.5	-
21NTO312T	Nano-composites	2	2	3	2.33	-	-	-	-	-	-	-	-	3	3	-
21NTO405T	Quantum Computing	3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
21NTO511T	Materials processing and Design	3	-	3	3	2	-	-	-	-	-	-	-	3	2	-
21NTS211T	Computational methods for materials science	3	3	-	-	3	-	-	-	-	-	-	-	3	2.67	3
Program Average		2.81	2.38	2.44	2.72	2.5	3	3	3	2.8	3	3	3	2.64	2.32	2.89

54. (g) Implementation Plan: Integrated M.Tech. in Materials Science & Engineering

Semester – I						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21LEH101T	Communicative English	2	1	0	3	
21MAB101T	Calculus and Linear Algebra	3	1	0	4	
21PYB102J	Semiconductor Physics and Computational methods	3	1	2	5	
21MES102L ¹	Engineering Graphics and Design	0	0	4	2	
21EES101T	Electrical and Electronics Engineering	3	1	0	4	
21CSS101J	Programming for Problem Solving	3	0	2	4	
21CYM101T ¹	Environmental Science	1	0	0	0	
21PDM101L ¹	Professional Skills and Practices	0	0	2	0	
21LEM101T ¹	Constitution of India	1	0	0	0	
Total Credits 22						

Semester – II						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21LEH102T	Chinese	2	1	0	3	
21LEH103T	French					
21LEH104T	German					
21LEH105T	Japanese					
21LEH106T	Korean					
21LEH107T	Spanish					
21LEH108T	Russian					
21GNH101J	Philosophy of Engineering	1	0	2	2	
21MAB102T	Advanced Calculus and Complex	3	1	0	4	
21CYB101J	Chemistry	3	1	2	5	
21BTB103T	Biology	2	0	0	2	
21NTC111T	Physics of Materials	3	0	0	3	
21MES101L ¹	Basic Civil and Mechanical Workshop	0	0	4	2	
21PDM102L ¹	General Aptitude*	0	0	2	0	
21GNM101L ¹	Physical and Mental Health using Yoga	0	0	2	0	
21GNM102L ¹	National Service Scheme					
21GNM103L ¹	National Cadet Corps					
21GNM104L ¹	National Sports Organization					
Total Credits 21						

Semester – III						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21MAB201T	Transforms and Boundary Value Problems	3	1	0	4	
21NTC211J	Electric, Electronic and Dielectric properties of materials	3	0	2	4	
21NTC212T	Engineering Thermodynamics	3	0	0	3	
21NTC213T ²	Kinetic, Diffusion and Mass Transfer	3	0	0	3	
21PDH209T ¹	Social Engineering	2	0	0	2	
21NTS211T	Computational Methods for Materials Science	3	0	0	3	
21LEM201T ¹	Professional Ethics	1	0	0	0	
21PDM201L ¹	Verbal Reasoning	0	0	2	0	
21LEM202T ¹	Universal Human Values-II: Understanding Harmony and Ethical Human Conduct	2	1	0	3	
Total Credits 22						

Semester – IV						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21MAB202T	Numerical Methods	3	1	0	4	
21CSC206T	Artificial Intelligence	2	1	0	3	
21NTC214J ²	Optical and Photonic Properties of Materials	3	0	2	4	
21NTC215J	Physical Metallurgy	3	0	2	4	
21NTC216T	Polymer Materials and Composites	3	0	0	3	
21DCS201P ¹	Design Thinking and Methodology	1	2	0	3	
E	Professional Elective – I	3			3	
21PDM202L ¹	Critical and Creative Thinking Skills	0	0	2	0	
Total Credits 24						

Semester – V						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21MAB203T	Probability and Stochastic Processes	3	1	0	4	
21NTC311L ¹	Materials Characterization Laboratory	0	0	6	3	
21NTC312T	Mechanical Behavior of Materials	3	0	0	3	
21NTC313T ²	Electrochemistry and Corrosion	3	1	0	4	
E	Professional Elective – II	3	0	0	3	
O	Open Elective – I	3	0	0	3	
21GNP301L ¹	Community Connect	0	0	2	1	
21PDM301L ¹	Analytical and Logical Thinking Skills	0	0	2	0	
21LEM301T ¹	Indian Art Form	1	0	0	0	
Total Credits 21						

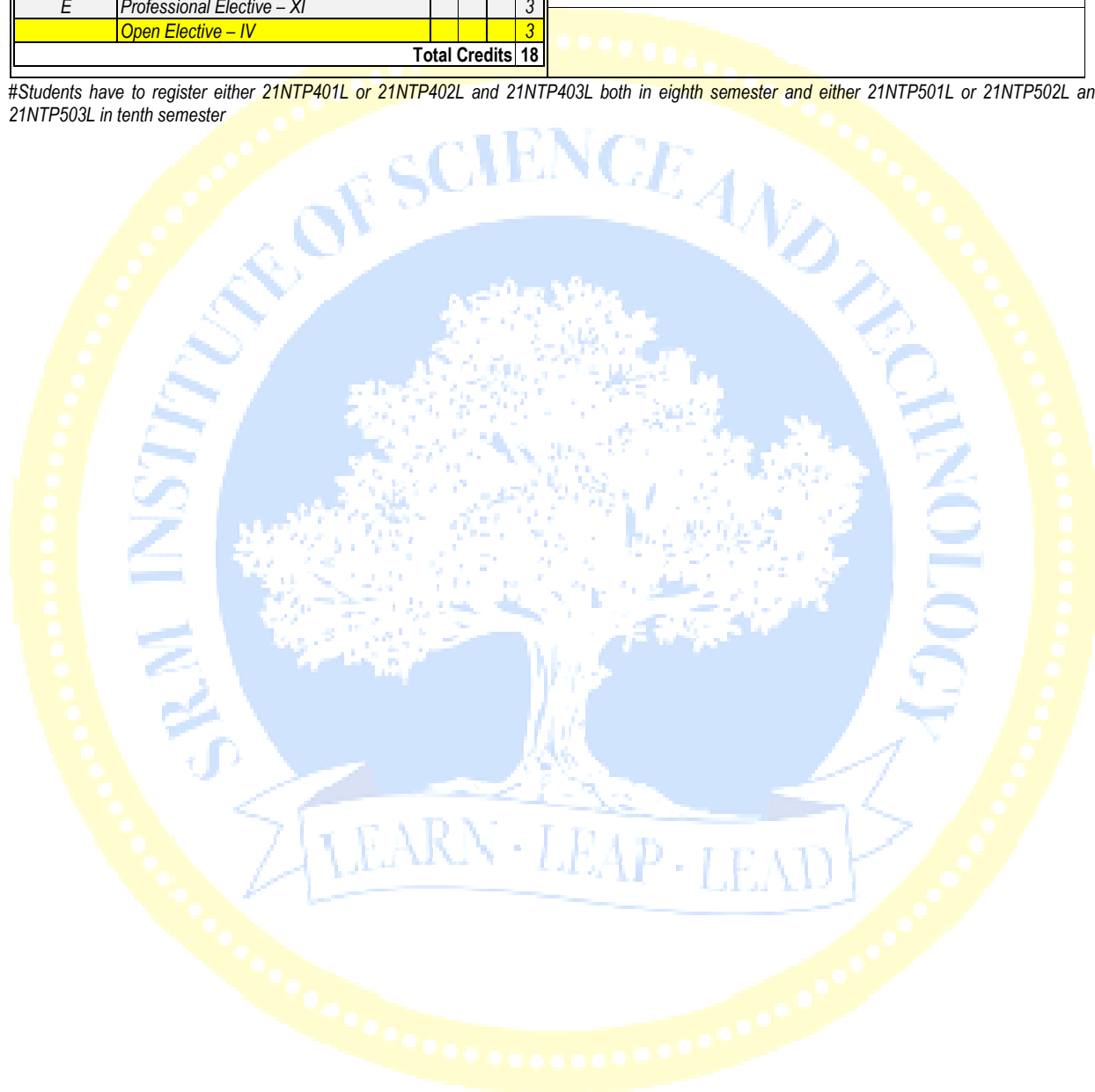
Semester – VI						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21CSS303T	Data Science	2	0	0	2	
21NTC315J ²	Magnetism and Magnetic Materials	2	0	2	3	
21NTC316T	Glass and Ceramics materials	3	0	0	3	
E	Professional Elective – III	3	0	0	3	
E	Professional Elective – IV	3	0	0	3	
O	Open Elective – II	3	0	0	3	
21NTP302L ¹	Project	0	0	6	3	
21NTP303T ¹	MOOC	3	0	0		
21PDM302L ¹	Employability Skills and Practices	0	0	2	0	
21LEM302T ¹	Indian Traditional Knowledge	1	0	0	0	
Total Credits 20						

Semester – VII						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21GNH401T	Behavioral Psychology	2	1	0	3	
E	Professional Elective - V	3	0	0	3	
E	Professional Elective - VI	3	0	0	3	
21NTC411L ¹	Nanoindentation and Nanotribology	0	0	6	3	
21NTC412T ²	Soft Matter	3	0	0	3	
O	Open Elective – III	3	0	0	3	
Total Credits 18						

Semester – VIII						
Course Code	Course Title	Hours / Week				
		L	T	P	C	
21NTC413T ²	Alloys: Ferrous and Non-ferrous	3	1	0	4	
21NTC414T	Engineering Biomaterials	3	1	0	4	
21IPC501J ²	Research Methodology	2	1	2	4	
21NTP401L	Major Project	0	0	30	15	
21NTP402L	Major Project	0	0	20	10	
21NTP403L	Internship	0	0	10	5	
Total Credits 27						

Semester - IX						Semester - X					
Course Code	Course Title	Hours / Week			C	Course Code	Course Title	Hours / Week			C
		L	T	P				L	T	P	
E	Professional Elective - VII				3	21NTP501L	Specialization Project	0	0	40	20
E	Professional Elective - VIII				3	21NTP502L	Specialization Project	0	0	30	15
E	Professional Elective - IX				3	21NTP503L	Domain Internship	0	0	10	5
E	Professional Elective - X				3	Total Credits					20
E	Professional Elective - XI				3						
	Open Elective - IV				3						
					Total Credits						18

#Students have to register either 21NTP401L or 21NTP402L and 21NTP403L both in eighth semester and either 21NTP501L or 21NTP502L and 21NTP503L in tenth semester





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