Revised Curriculum

M.Tech

in

Materials Science and Engineering

Effective from August 2024

DEPARTMENT OF
METALLURGICAL AND MATERIALS ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI
TIRUCHIRAPPALLI-620015,
TAMIL NADU, INDIA

VISION OF THE INSTITUTE

- To be a university globally trusted for technical excellence where learning and research integrate to sustain society and industry.

MISSION OF THE INSTITUTE

- To offer undergraduate, postgraduate, doctoral and modular programmes in multi-disciplinary / inter-disciplinary and emerging areas.
- To create a converging learning environment to serve a dynamically evolving society.
- To promote innovation for sustainable solutions by forging global collaborations with academia and industry in cutting-edge research.
- To be an intellectual ecosystem where human capabilities can develop holistically.

VISION OF THE DEPARTMENT

To evolve into a globally recognized department in the frontier areas of Metallurgical and Materials Engineering.

MISSION OF THE DEPARTMENT

- To produce Metallurgical and Materials Engineering graduates having professional excellence.
- To carry out quality research having social & industrial relevance.
- To provide technical support to budding entrepreneurs and existing industries

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1	Pursuing a career in traditional and cutting-edge areas of Materials Engineering and related fields.
PEO2	Enable them to make consistent progress towards a higher degree in Materials Engineering and allied fields.
PEO3	Managing challenging industrial issues and excelling in global industries with strong leadership skills.

PROGRAMME OUTCOMES (POs)

PO1	An ability to independently carry out research /investigation and development work to solve practical problems •
PO2	An ability to write and present a substantial technical report/document
PO3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

CURRICULUM FRAMEWORK / FLEXIBLE CURRICULUM / NEP 2020 / M.Tech. / M.Arch.

Components	Number of Courses	Number of Credits	Senate Suggestions
Programme Core (PC)	3 / Semester (6 / Year)	44	4 or 3 credits can be the combination of Programme Core (PC) and Programme Elective (PE)
Programme Elective (PE)	3 / Semester (6 / Year)		
Essential Laboratory Requirements (ELR)	2/ Year	4	2 Credits / ELR (If the department opts for 2 Essential Laboratory Requirements (ELR) per year, totalling 4 credits, the remaining 2 credits can be allocated to PC or PE courses)
Internship / Industrial Training / Academic Attachment (I/A)	1	2	-
Open Elective (OE) / Online Course (OC)	2	6	Open Elective (OE) / Online Course (OC) can be completed between 1 – 4 Semester
Project Phase-I	1	12	-
Project Phase-II	1	12	-
Total	**20**	**80**	**-**

CURRICULUM

SEMESTER I

Code	Course of Study	Credit
MA 613	Programme Core 1: Engineering Mathematics	4
MT 621	Programme Core 2: Thermodynamics and Kinetics	4
MT 623	Programme Core 3: Electrical, Magnetic and Optical Materials	4
	Programme Elective I	4
	Programme Elective II	3
	Programme Elective III /Online (NPTEL)	3
MT 629	Laboratory I: Materials Characterisation Laboratory	2
		24

SEMESTER II

Code	Course of Study	Credit
MT 622	Programme Core 4: Ceramic Science and Technology	4
MT 624	Programme Core 5: Polymers and Composites	4
MT 626	Programme Core 6: Metallic Materials	4
	Programme Elective IV	4
	Programme Elective V	3
	Programme Elective VI /Online (NPTEL)	3
MT 630	Laboratory II: Functional Materials Laboratory	2
		24

SUMMER TERM (evaluation in the III semester)

Code	Course of Study	Credit
MT 631	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
MT 639	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
MT 640	Project Work (Phase II)	12

SEMSTER (I-IV)

Code	Course of Study	Credit
MTXXX	Open Elective/Online Course 1	3
MTXXX	Open Elective/Online Course 2	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
PE courses for all MME MTech specializations			
1.	MT 661	Physical Metallurgy	4
2.	MT 662	Testing, Inspection and Characterisation	4
3.	MT 663	Mechanical Behaviour of Materials	3
4.	MT 664	Corrosion Engineering	3
5.	MT 665	Computational Techniques	3
6.	MT 666	Metallurgical Failure Analyses	3
7.	MT 667	Surface Engineering	3
8.	MT 668	Modelling in Materials Processing	3
9.	MT 669	Automotive Materials	3
10.	MT 670	Nanomaterials and Technology	3
11.	MT 671	Advanced Electrochemical Techniques	3
12.	MT 672	Developments in Iron-Making and Steel-Making	3
13.	MT 673	Additive Manufacturing	3
14.	MT674	Phase Transformations	3
15.	MT675	Crystallography	3
16.	MT676	Particulate Technology	3
17.	MT677	Process Modelling	3
18.	MT678	Advanced Material Characterisation Techniques	3
19.	MT679	Non-Destructive Testing	3
PE courses for MSE specialization			
20.	MT 721	High-Temperature Materials	3
21.	MT 722	Biomaterials	3
22.	MT 723	Severe Plastic Deformation	3
23.	MT 724	Nuclear Materials	3
24.	MT 725	Manufacturing Processes	3
25.	MT 726	Structure-Property Relations in Nonferrous Metals	3
26.	MT 727	Polymer Processing	3

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.	MT 761	Design and Selection of Materials	3
2.	MT 762	Statistical Quality Control and Management	3
3.	MT 763	Intellectual Property Rights	3
4.	MT 764	Innovation and Product Development	3
5.	MT 765	Energy Storage Systems	3
6.	MT 766	Artificial Intelligence in Materials Engineering	3
7.	MT 767	Molecular Modeling of Materials	3

OPEN ELECTIVES (OE) (List some courses from Programme Electives that will be Open Electives for other Specialization if it is not offered as Programme Electives for the respective specialization)

Sl. No.	Code	Course of Study	Credit
OE for specialisations other than MSE			
1.	MT 721	High-Temperature Materials	3
2.	MT 722	Biomaterials	3
3.	MT 723	Severe Plastic Deformation	3
4.	MT 724	Nuclear Materials	3
5.	MT 726	Structure-Property Relations in Nonferrous Metals	3
6.	MT 727	Polymer Processing	3

MICROCREDITS (MC) (Students can opt 3 courses of 1 credit (4 weeks) each as microcredits instead of 1 OE/OC)

Sl. No.	Code	Course of Study	Credit
1.			
2.			