

**B. TECH. (METALLURGICAL & MATERIALS ENGINEERING)  
COMPONENT WISE DISTRIBUTION**

Main Curriculum Components	Sub Components	Approved Credits for B. Tech.	Approved Credits Range	Proposed Credits for B. Tech. by Department	Proposed Credits Range
<b>Institute Core Course</b>	HSSC	5	52-58	5	57
	HSSEC	6		6	
	MC	3		3	
	BSC	12-20		16	
	ESC	8-20		16	
	DSC	4		4	
	ESSC	3		3	
	TM	4		4	
<b>Program Core Course</b>	CCCC	40-48	87-91	45	89
	AI/ML	2		2	
	Engg. Analysis and design (design thinking based project)/Industry Oriented Problem Solving/ Lab based Project/ Practical Problem/ Case study	4		4	
	Technical Communication	2		2	
	BTP/Entrepreneurship/ Project-based internship/PEC	6-10		8	
	PEC	22-26		22	
	TEB	6-8		6	
	OEC	9-12		9-12	
	CORE	2	2	2	2
	<b>Total</b>	<b>150-160</b>		<b>157-160</b>	
	MSC/DHC	<b>18/20</b>		<b>18/20</b>	
	<b>Grand Total</b>			<b>175-180</b>	

**DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING  
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

**Program Code** : 118      **B. Tech. (Metallurgical & Materials Engineering)**  
**Department** : MT      **Metallurgical & Materials Engineering**

**Teaching Scheme**

<b>Year</b>	<b>Credits in Autumn Semester</b>	<b>Credits in Spring Semester</b>	<b>Credits (Year – wise)</b>
<b>1</b>	23	23	46
<b>2</b>	23/24	24/25	47/49
<b>3</b>	20/21	20	40/41
<b>4</b>	12	12	24
<b>Grand Total</b>			<b>157-160</b>
<b>Total with MSC/DHC</b>	<b>With addition 18-20 credits</b>		<b>175-180</b>

<b>Non-Credit Elements (NCE)</b>	<b>Components</b>	<b>Maximum Units</b>	<b>Minimum Units</b>	<b>Comments</b>
	<b>Discipline (DIS)</b>	<b>16</b>	<b>8</b>	To be evaluated by DoSW
	<b>NCC/NSS/NSO</b>	<b>8</b>	<b>4</b>	To be evaluated by DoSW
	<b>Internship (INT)</b>	<b>24</b>	<b>8</b>	1-week internship= 1 unit (to be coordinated by the deptt./Centres/School)
	<b>Participation in professional development programs by Industry experts/ field experts (PPD-1 &amp; PPD-2)</b>	<b>8</b>	<b>4</b>	To be coordinated by the departments/Centres/school (2 <sup>nd</sup> & 3 <sup>rd</sup> Years)
<b>Minimum non-credit units to be earned: 24</b>				









**List of Program Elective Courses**

Teaching Scheme					Contact Hours/Week			Exam. Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PR S	MTE	ETE	PRE
1.	MTL-311	Fuel, Furnaces and Refractories	PEC	3	2	1	0	3	-	20-35	-	20-30	40-50	-
2.	MTL-312	Mineral Processing	PEC	3	2	0	2	3	-	10-25	25	15-25	30-40	-
3.	MTL-313	Introduction to Nanomaterials	PEC	3	2	0	2	3	-	10-25	25	15-25	30-40	-
4.	MTL-314	Thin Film Technology	PEC	3	3	0	0	3	-	20-35	-	20-30	40-50	-
5.	MTL-315	Transport Phenomena	PEC	3	2	1	0	3	-	20-35	-	20-30	40-50	-
6.	MTL-511	Principles of Solidification	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
7.	MTL-512	Engineering Ceramics	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
8.	MTL-513	Principles of Materials Selection	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
9.	MTL-514	High Temperature Materials	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
10.	MTL-515	Composite Materials	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
11.	MTL-516	Diffusion in Solids	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
12.	MTL-517	Defects in Crystalline Materials	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
13.	MTL-518	Nanotechnology: Materials & Devices	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
14.	MTL-519	Advanced Steel Technology	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
15.	MTL-520	Physical Metallurgy of light metals & alloys	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
16.	MTL-521	Corrosion protection methods	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
17.	MTL-522	Microsensor, MEMS & Smart Devices	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
18.	MTL-523	Electro-Ceramics	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
19.	MTL-524	Materials for Renewable Energy	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
20.	MTL-525	Biomaterials	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
21.	MTL-526	Energy storage Materials	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
22.	MTL-527	Failure Analysis	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
23.	MTL-528	Tribology of Engineering Materials	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
24.	MTL-529	Non-ferrous extraction	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
25.	MTL-530	Materials Modeling and Simulation	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-



**List of Talent Enhancement Basket Courses**

Teaching Scheme					Contact Hours/Week			Exam Duration		Relative Weight (%)				
S. No.	Course Code	Course Title	Area	Cr.	L	T	P	Th.	Pr.	CWS	PRS	MTE	E T E	PRE
<b>TEB-A (Materials Processing)</b>														
1	MTT-101	Additive Manufacturing	TEB	3	2	1	0	3	-	20-35	-	20-30	40-50	-
2	MTT-102	Metal Recovery and Recycling	TEB	3	2	1	0	3	-	20-35	-	20-30	40-50	-
3	MTT-103	Metallurgy of Joining	TEB	3	2	1	0	3	-	20-35	-	20-30	40-50	-
<b>TEB-B (Materials Characterization)</b>														
1	MTT-104	X-ray Diffraction Techniques	TEB	3	2	1	0	3	-	20-35	-	20-30	40-50	-
2	MTT-105	Electron Microscopy	TEB	3	2	1	0	3	-	20-35	-	20-30	40-50	-
3	MTT-106	Crystallographic Texture	TEB	3	2	1	0	3	-	20-35	-	20-30	40-50	-

**Open electives:**

Teaching Scheme					Contact Hours/Week			Exam. Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
1.	MTO-101	Introduction to Nanomaterials	OEC	3	2	0	2	3	-	10-25	25	15-25	30-40	-
2.	MTO-102	Thin Film Technology	OEC	3	3	0	0	3	-	20-35	-	20-30	40-50	-

### **Minor Specialisation Courses**

S.No.	Code	Course title	Semester	Credits
1	MTC-102	Introduction to Materials Engineering	Spring	3
2	MTC-104	Metallurgical Thermodynamics and Kinetics	Spring	3
3	MTC-201	Phase Transformation and Heat Treatment	Autumn	4
4	MTC-203	Mechanical Behaviour of Materials	Autumn	4
5	MTC-205	Iron and Steel Making	Autumn	4
6	MTC-202	Metal Processing	Spring	4
7	MTC-204	Characterization Techniques for Materials	Spring	4
8	MTC-206	Engineering Polymers and Composites	Spring	3
9	MTC-301	Electrical and Electronic Materials	Autumn	3
10	MTC-302	Corrosion Engineering	Spring	3
11	MTC-304	Ceramics and Metal Powder Processing	Spring	4

**Departmental Honours Courses:** All PG Program Elective Courses of the Department of Metallurgical & Materials Engineering.

