

**DEPARTMENT OF MATHEMATICS**  
**5 year BSMS (Mathematics and Computing) with exit policy**

**Component wise distribution**

Main Curriculum Components	Sub Components	Approved Credits for 5 year BSMS	Approved Credits Range	Proposed credits for 5 year BSMS by Department	Proposed Credits Range	Approved Credits for 4 year BSMS exit	Approved Credits Range	Proposed credits for 4 year BSMS exit by Department	Proposed Credits Range
Institute Core Course	HSSC	5	52-58	5	53	5	45-65	5	53
	HSSEC	6		6		6		6	
	MC	3		3		3		3	
	BSC	12-20		20		12-20		20	
	ESC	8-20		8		8-20		8	
	DSC	4		4		4		4	
	ESSC	3		3		3		3	
	TM	4		4		4		4	
Program Core Course	CCCC	52-62	127-133	56	128	40-48	82-100	44	92
	AI/ML	2		2		2		2	
	Engg. Analysis and design (design thinking-based project)/Industry Oriented Problem Solving/ Lab based Project/ Practical Problem/ Case study	4		4		4		4	
	Technical Communication	2		2		2		2	
	BTP/Entrepreneurship/ Project-based internship/PEC/ Thesis	16		16		6-10		8	
	PEC	32-40		40		22-26		24	
	TEB	6-8		8		6-8		8	
	OEC	9-12		9-12		9-12		9-12	
CORE	2	2	2	2	2	2	2	2	
	Total	<b>190-200</b>		<b>192-195</b>		<b>138-179</b>		<b>156-159</b>	
	MSC/DHC	<b>18/20</b>		<b>18-20</b>		<b>18-20</b>		<b>18-20</b>	
	Grand Total			<b>210-215</b>		156-199		<b>174-179</b>	

**DEPARTMENT OF MATHEMATICS**  
**INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**  
**5 year BSMS (Mathematics and Computing) with exit policy**

Program Code : 323 - BS-MS (Mathematics and Computing)  
 Department : MA – Mathematics

**Teaching Scheme**

<b>Year</b>	<b>Credits in Autumn Semester</b>	<b>Credits in Spring Semester</b>	<b>Credits (Year-wise)</b>
1	23	21	44
2	23/24	19/20	42/44
3	19/20	19	38/39
4	20	20	40
5	18	10	28
<b>Grand Total</b>			<b>192-195</b>
<b>Total with Minor Specialization Courses</b>	with additional 18-20 credits (mentioned in the parentheses)		<b>210-215</b>

	<b>Components</b>	<b>Maximum</b>	<b>Minimum</b>	<b>Comments</b>
	Discipline (DIS)	20	10	To be evaluated by DoSW
<b>Non-Credit Elements (NCE)</b>	NCC/NSS/NSO	8	4	To be evaluated by DoSW
	Internship (INT)	32	10	1 week internship= 1 unit (To be coordinated by departments/centres/school)
	Participation in professional development programs by Industry experts/ field experts (PPD-1, PPD-2 & PPD-3)	12	6	To be coordinated by departments/centres/school (2 <sup>nd</sup> , 3 <sup>rd</sup> and 4 <sup>th</sup> Years)
<b>Minimum non-credit to be earned: 30</b>				

**DEPARTMENT OF MATHEMATICS**  
**INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**  
**4 year BSMS (Mathematics and Computing) with exit policy**

Program Code : 323 - BS-MS (Mathematics and Computing)  
Department : MA – Mathematics

**Teaching Scheme**

<b>Year</b>	<b>Credits in Autumn Semester</b>	<b>Credits in Spring Semester</b>	<b>Credits (Year-wise)</b>
1	23	21	44
2	23/24	19/20	42/44
3	19/20	19	38/39
4	16	16	32
<b>Grand Total</b>			<b>156-159</b>
<b>Total with Minor Specialization Courses</b>	with additional 18-20 credits (mentioned in the parentheses)		<b>174-179</b>

Non-Credit Elements (NCE)	Components	Maximum Units	Minimum Units	Comments
	Discipline (DIS)	16	8	To be evaluated by DoSW
	NCC/NSS/NSO	8	4	To be evaluated by DoSW
	Internship (INT)	24	8	1-week internship= 1 unit (to be coordinated by the deptt. /Centres/School)
	Participation in professional development programs by Industry experts/ field experts (PPD-1 & PPD-2)	8	4	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>				





**DEPARTMENT OF MATHEMATICS**

Program Code : **323 - BS-MS (Mathematics and Computing)**  
 Department : **MA – Mathematics**  
 Year : **III**

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs.)		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
<b>(Autumn)</b>														
1.	OEC-III	Open Elective Course-III	OEC	3/4										
2.	MAC-351	Fundamentals of AI/ML	PCC	2	2	0	0	2	0	20-35	-	20-30	40-50	-
3.	MAC-301	Basic Abstract Algebra	PCC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
4.	MAL-I	Program Elective Course-I	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
5.	MAT-I	Talent Enhancement-I	TEB	4	3	1	0	3	0	20-35	-	20-30	40-50	-
6.	MAC-399	Community Outreach	CORE	2	2	0	0	3		100				
<b>Total</b>				<b>19-20</b>										
<b>(Spring)</b>														
1.	HSSEC-II	HSS Elective Course-II	HSSEC	3										
2.	MAC-302	Theory of Differential Equations	PCC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
3.	MAL-II	Program Elective Course-II	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
4.	MAT-II	Talent Enhancement-II	TEB	4	3	1	0	3	0	20-35	-	20-30	40-50	-
5.	MAC-300	Lab/Industry Based Project	PCC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
6.	MSC-I	Minor Specialization Course-I	MSC	3/4										
<b>Total</b>				<b>19/ 22-23</b>										
<b>Note:</b> Students willing to exit with BS Degree in Mathematics and Computing must inform to Dean (Academic Affairs) after completion of 6 <sup>th</sup> semester														









### List of Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs.)		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
1	MAL-411	Analytic Number Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
2	MAL-412	Combinatorial Mathematics	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
3	MAL-413	Credit Risk Modeling	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
4	MAL-4xx	Design and Analysis of Algorithms	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
5	MAL-414	Differential Geometry	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
6	MAL-416	Graph Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
7	MAL-417	Mathematical Image Processing	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
8	MAL-4xx	Mathematical Modeling and Simulation	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
9	MAL-4xx	Number Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
10	MAL-4xx	Statistical Machine Learning	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
11	MAL-511	Abstract Harmonic Analysis	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
12	MAL-512	Advanced Complex Analysis	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
13	MAL-513	Advanced Matrix Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
14	MAL-514	Advanced Numerical Analysis	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
15	MAL-515	Advanced Operations Research	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
16	MAL-516	Advanced Partial Differential Equations	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
17	MAL-517	Algebraic Number Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
18	MAL-518	Algebraic Topology	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
19	MAL-519	Approximation Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
20	MAL-520	Coding Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
21	MAL-521	Commutative Algebra	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
22	MAL-522	Computational Fluid Dynamics	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
23	MAL-523	Control Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
24	MAL-524	Dynamical Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-

25	MAL-5xx	Fluid Dynamics	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
26	MAL-xxx	Fourier Analysis and Applications	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
27	MA-527	Fuzzy Sets and Fuzzy Systems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
28	MAL-528	Hyperbolic Conservation Laws	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
29	MAL-529	Integral Equations and Calculus of Variations	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
30	MAL-531	Mathematical Biology	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
31	MAL-532	Mathematical Cryptography	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
32	MAL-533	Measure Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
33	MAL-534	Multivariate Techniques	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
34	MAL-535	Numerical Linear Algebra	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
35	MAL-536	Operator Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
36	MAL-537	Optimal Control Theory	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
37	MAL-538	Orthogonal Polynomials and Special Functions	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
38	MAL-539	Portfolio Optimization	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
39	MAL-540	Regularization Theory for Inverse Problems	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
40	MAL-541	Representation Theory of Finite Groups	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
41	MAL-542	Semigroup Theory and Applications	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
42	MAL-543	Sobolev Spaces and Applications	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
43	MAL-544	Statistical Inference	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
44	MAL-545	Stochastic Differential Equations	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
45	MAL-546	Stochastic Partial Differential Equations	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
46	MAL-547	Wavelet Analysis	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-

### List of Talent Enhancement Course

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	ETE	PRE
<b>TEB-I (Optimization)</b>														
1	MAT-101	Numerical Optimization	TEB	4	3	1	0	3	0	20-35	-	20-30	40-50	-
2	MAT-102	Non linear Programming	TEB	4	3	1	0	3	0	20-35	-	20-30	40-50	-
<b>TEB-II (Numerical Analysis)</b>														
1	MAT-103	Numerical Analysis	TEB	4	3	1	0	3	0	20-35	-	20-30	40-50	-
2	MAT-104	Finite Element Methods	TEB	4	3	1	0	3	0	20-35	-	20-30	40-50	-
<b>TEB-III (Financial Mathematics)</b>														
1	MAT-105	Financial Mathematics	TEB	4	3	1	0	3	0	20-35	-	20-30	40-50	-
2	MAT-106	Financial Risk Management	TEB	4	3	1	0	3	0	20-35	-	20-30	40-50	-

### Minor Specialisation Courses (20 credits)

Students of other departments can take any 5 courses from the following.

Sub. Code	Course Title	Credits	Prerequisite	Semester
MAC-102	Discrete Mathematics	4		Spring
MAC-104	Elementary Real Analysis	4		Spring
MAB-104	Mathematical Methods*	4		Autumn
MAB-103	Numerical Methods*	4		Autumn
MAC-201	Operations Research	4		Autumn
MAC-202	Complex Analysis	4	MAC-104	Spring
MAC-301	Basic Abstract Algebra	4		Autumn
MAC-302	Theory of Differential Equations	4	MAB-201	Spring
MAC-403	Linear Algebra	4		Autumn
MAC-405	Real Analysis	4	MAC-104	Autumn

\*Not allowed if already studied in the BSC category