

13. COURSES OF STUDY AND SCHEME OF ASSESSMENT MSc DATA SCIENCE

(2020 REGULATIONS)
(Minimum No. of Credits to be Earned: 213*)

Course Code	Course Title	Hours / Week			Credits	PREREQUISITES	Maximum marks			CAT
		L	T	P			CA	FE	Tot	
I SEMESTER										
20XD11	CALCULUS AND ITS APPLICATIONS	3	2	0	4	NA	50	50	100	BS
20XD12	BASICS OF COMPUTATIONAL BIOLOGY	3	2	0	4	NA	50	50	100	BS
20XD13	DIGITAL ELECTRONICS	4	0	0	4	NA	50	50	100	BS
20XD14	PROBLEM SOLVING & C PROGRAMMING	4	0	0	4	NA	50	50	100	PC
20XD15	ENGLISH FOR PROFESSIONAL SKILLS	3	0	0	3	NA	50	50	100	HS
20XD16	ENGINEERING GRAPHICS AND GEOMETRIC MODELLING	0	0	4	2	NA	100	-	100	ES
20XD17	C PROGRAMMING LAB	0	0	4	2	NA	100	-	100	PC
20XD18	DIGITAL ELECTRONICS LAB	0	0	2	1	NA	100	-	100	BS
20XD29	PERSONALITY AND CHARACTER DEVELOPMENT	0	0			** Refer Sem 2 and footnote				MC
Total 31 Hrs		17	4	10	24		550	250	800	
II SEMESTER										
20XD21	DISCRETE STRUCTURES	3	2	0	4	NA	50	50	100	BS
20XD22	ABSTRACT ALGEBRA	3	2	0	4	NA	50	50	100	BS
20XD23	DATA STRUCTURES AND ALGORITHMS	3	0	0	3	20XD14	50	50	100	PC
20XD24	OBJECT ORIENTED PROGRAMMING	3	0	0	3	20XD14	50	50	100	PC
20XD25	THEORY OF PROBABILITY	4	0	0	4	20XD11	50	50	100	PC
20XD26	OBJECT COMPUTING LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD27	DATA STRUCTURES LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD28	PYTHON PROGRAMMING LAB	0	0	4	2	20XD14	100	-	100	PC
20XD29	PERSONALITY AND CHARACTER DEVELOPMENT	0	0			**Grade---				MC
Total 32 Hrs		16	4	12	24		550	250	800	

* Indicated is the minimum number of credits to be earned by a student.

** - Total 40 hrs in semesters I & II put together.

Grade: Completed / Not Completed.

CA – Continuous Assessment ; FE – Final Examination; CAT – Category; BS –Basic Sciences; HS- Humanities & Social Sciences; ES- Engineering Sciences; PC – ProfessionalCore; PE – Professional Elective; OE-Open Elective; EEC – Employability Enhancement Course; MC – Mandatory Course; L – Lecture; T-Tutorial; P-Practical; Tot-Total.

Course Code	Course Title	Hours / Week			Credits	PREREQUISITES	Maximum marks			CAT
		L	T	P			CA	FE	Tot	
III SEMESTER										
20XD31	APPLIED STATISTICS	3	0	0	3	20XD25	50	50	100	PC
20XD32	LINEAR ALGEBRA	3	2	0	4	20XD22	50	50	100	BS
20XD33	GRAPH THEORY	4	0	0	4	20XD21, 20XD23	50	50	100	BS
20XD34	ADVANCED DATA STRUCTURES	3	0	0	3	20XD23	50	50	100	PC
20XD35	COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING	3	2	0	4	20XD13	50	50	100	PC
20XD36	APPLIED STATISTICS AND R PROGRAMMING LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD37	ADVANCED DATA STRUCTURES LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD38	JAVA PROGRAMMING LAB	0	0	4	2	20XD24	100	-	100	PC
Total 32 Hrs		16	4	12	24		550	250	800	
IV SEMESTER										
20XD41	OPTIMIZATION TECHNIQUES	3	2	0	4	20XD32	50	50	100	BS
20XD42	DATA BASE DESIGN	3	0	0	3	20XD21, 20XD23	50	50	100	PC
20XD43	PREDICTIVE ANALYTICS	3	0	0	3	20XD25, 20XD31	50	50	100	PC
20XD44	OPERATING SYSTEMS	3	2	0	4	20XD14, 20XD23, 20XD35	50	50	100	PC
20XD45	TRANSFORMS AND ITS APPLICATIONS	4	0	0	4	20XD11, 20XD32	50	50	100	PC
20XD46	DATA ANALYTICS & VISUALISATION LAB	0	0	4	2	NA	100	-	100	PC
20XD47	RDBMS LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD48	SCIENTIFIC COMPUTING LAB	0	0	4	2	20XD32	100	-	100	PC
Total 32 Hrs		16	4	12	24		550	250	800	
V SEMESTER										
20XD51	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3	20XD21, 20XD23, 20XD34, 20XD41	50	50	100	PC
20XD52	STOCHASTIC MODELS	4	0	0	4	20XD25, 20XD31	50	50	100	PC
20XD53	COMPUTER NETWORKS	3	2	0	4	20XD28, 20XD35, 20XD44	50	50	100	PC
20XD54	MACHINE LEARNING	3	0	0	3	20XD25, 20XD31, 20XD32, 20XD41	50	50	100	PC
20XDA_	PROFESSIONAL ELECTIVE-I	3	2	0	4	REFER THE COURSE	50	50	100	PE
20XD56	DESIGN AND ANALYSIS OF ALGORITHMS LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD57	MACHINE LEARNING LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD58	CAPSTONE PROJECT	0	0	4	2	-	100	-	100	PC
Total 32 Hrs		16	4	12	24		550	250	800	

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Course Code	Course Title	Hours/ Week			Credits	PREREQUISITES	Maximum marks			CAT
		L	T	P			CA	FE	Tot	
VI SEMESTER										
20XD61	PARALLEL AND DISTRIBUTED COMPUTING	3	0	0	3	20XD44, 20XD53	50	50	100	PC
20XD62	DEEP LEARNING	3	0	0	3	20XD54	50	50	100	PC
20XD63	BIG DATA & MODERN DATABASE SYSTEMS	3	0	0	3	20XD34, 20XD42	50	50	100	PC
20XD64	ARTIFICIAL INTELLIGENCE	3	2	0	4	20XD21, 20XD23, 20XD25, 20XD33	50	50	100	PC
20XDA_	PROFESSIONAL ELECTIVE -II	3	2	0	4	REFER THE COURSE	50	50	100	PE
20XD66	PARALLEL AND DISTRIBUTED COMPUTING LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD67	BIG DATA & MODERN DATABASE SYSTEMS LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD68	DEEP LEARNING LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
Total 31 Hrs		15	4	12	23		550	250	800	
VII SEMESTER										
20XDP1	PROJECT WORK I	0	0	-	12		50	50	100	EEC
VIII SEMESTER										
20XD81	REINFORCEMENT LEARNING	3	0	0	3	20XD54, 20XD64	50	50	100	PC
20XD82	NATURAL LANGUAGE PROCESSING	3	0	0	3	20XD54, 20XD64	50	50	100	PC
20XD83	DATA MINING	3	0	0	3	20XD42, 20XD54	50	50	100	PC
20XDA_	PROFESSIONAL ELECTIVE-III	3	2	0	4	REFER THE COURSE	50	50	100	PE
20XDO_	OPEN ELECTIVE-I	3	2	0	4	REFER THE COURSE	50	50	100	OE
20XD86	REINFORCEMENT LEARNING LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD87	NATURAL LANGUAGE PROCESSING LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD88	DATA MINING LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
Total 31 Hrs		15	4	12	23		550	250	800	
IX SEMESTER										
20XD91	DATA PRIVACY AND SECURITY	3	0	0	3	20XD53, 20XD54	50	50	100	PC
20XD92	NETWORK SCIENCE	3	0	0	3	20XD33, 20XD52	50	50	100	PC
20XD93	INFORMATION RETRIEVAL & WEB SEARCH	3	0	0	3	20XD31, 20XD32, 20XD34	50	50	100	PC
20XDA_	PROFESSIONAL ELECTIVE - IV (SELF STUDY)	3	2	0	4	REFER THE COURSE	50	50	100	PE
20XDO_	OPEN ELECTIVE-II	3	2	0	4	REFER THE COURSE	50	50	100	OE
20XD96	INFORMATION RETRIEVAL & WEB SEARCH LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD97	DATA PRIVACY AND SECURITY LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC
20XD98	NETWORK SCIENCE LAB	0	0	4	2	SAME AS THEORY	100	-	100	PC

Total 31 Hrs		15	4	12	23		550	250	800	
X SEMESTER										
20XDP2	PROJECT WORK II	0	0	-	12		50	50	100	EEC

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MSc DATA SCIENCE**(2020 REGULATIONS)**

Course Code	Course Title	Hours / Week			Credits	PREREQUISITES	Maximum marks			CAT
		L	T	P			CA	FE	Tot	
PROFESSIONAL ELECTIVE (Four to be opted)										
20XDA1	DATA COMPRESSION	3	2	0	4	20XD23,20XD25, 20XD45	50	50	100	PE
20XDA2	MOBILE COMPUTING	3	2	0	4	20XD53	50	50	100	PE
20XDA3	DIGITAL IMAGE PROCESSING	3	2	0	4	20XD11,20XD21,20XD25, 20XD32	50	50	100	PE
20XDA4	MULTIMEDIA ANALYTICS	3	2	0	4	20XD54, 20XDA3	50	50	100	PE
20XDA5	COMPUTATIONAL NEUROSCIENCE	3	2	0	4	20XD12, 20XD33, 20XD52,20XD54	50	50	100	PE
20XDA6	PERVASIVE COMPUTING	3	2	0	4	20XD53, 20XD35	50	50	100	PE
20XDA7	MARKETING ANALYTICS	3	2	0	4	20XD54, 20XD43	50	50	100	PE
20XDA8	WEB ANALYTICS	3	2	0	4	20XD54	50	50	100	PE
20XDA9	COMPUTER GRAPHICS	3	2	0	4	20XD23, 20XD32	50	50	100	PE
20XDAA	ALGORITHMS FOR BIOINFORMATICS	3	2	0	4	20XD12, 20XD54	50	50	100	PE
20XDAB	MATHEMATICAL MODELING	3	2	0	4	20XD41, 20XD43,20XD52	50	50	100	PE
20XDAC	SOFTWARE ENGINEERING	3	2	0	4	20XD24	50	50	100	PE
20XDAD	SOFTWARE PATTERNS	3	2	0	4	20XDAC	50	50	100	PE
20XDAE	APPLIED GRAPH ALGORITHMS	3	2	0	4	20XD33	50	50	100	PE
20XDAF	GAME THEORY	3	2	0	4	20XD41	50	50	100	PE
20XDAG	SOCIAL NETWORK DATA ANALYTICS	3	2	0	4	20XD33, 20XD34	50	50	100	PE
20XDAH	HEALTH ANALYTICS	3	2	0	4	20XD54, 20XD82	50	50	100	PE
20XDAI	CYBER SECURITY ANALYTICS	3	2	0	4	20XD54, 20XD82, 20XD83	50	50	100	PE
20XDAJ	INTERNET OF THINGS	3	2	0	4	20XD44, 20XD53, 20XD61	50	50	100	PE
20XDAK	CLOUD COMPUTING	3	2	0	4	20XD61	50	50	100	PE
20XDAL	LARGE SCALE MACHINE LEARNING	3	2	0	4	20XD41, 20XD54	50	50	100	PE
20XDAM	WIRELESS NETWORKS	3	2	0	4	20XD53	50	50	100	PE
20XDAN	SURVIVAL ANALYTICS	3	2	0	4	20XD25,20XD52,20XD54	50	50	100	PE
20XDAO	RANDOMIZED ALGORITHMS	3	2	0	4	20XD25, 20XD34, 20XD51,20XD52	50	50	100	PE

OPEN ELECTIVES (Two to be opted)										
20XDO1	COMPUTATIONAL FINANCE	3	2	0	4	20XD11, 20XD25, 20XD52	50	50	100	OE
20XDO2	COMPUTATIONAL GEOMETRY	3	2	0	4	20XD33, 20XD34	50	50	100	OE
20XDO3	PRINCIPLES OF MANAGEMENT AND BEHAVIOURAL SCIENCES	3	2	0	4	NA	50	50	100	OE
20XDO4	ENTREPRENEURSHIP	3	2	0	4	NA	50	50	100	OE
20XDO5	INFORMATION THEORY AND ERROR CONTROL CODING	3	2	0	4	20XD25, 20XD32, 20XDA1	50	50	100	OE
20XDO6	ACCOUNTING AND FINANCIAL MANAGEMENT	3	2	0	4	NA	50	50	100	OE
20XDO7	ENVIRONMENTAL SCIENCE AND GREEN COMPUTING	3	2	0	4	NA	50	50	100	OE
20XDO8	FUNCTIONAL ANALYSIS	3	2	0	4	20XD22, 20XD32	50	50	100	OE
20XDO9	ADVANCED OPTIMIZATION TECHNIQUES	3	2	0	4	20XD32, 20XD41	50	50	100	OE

Labeling & Group of Courses

PROFESSIONAL CORE (PC)			
Sl.No.	Course Code	Course Title	L:T:P:C
1.	20XD14	PROBLEM SOLVING & C PROGRAMMING	4:0:0:4
2.	20XD17	C PROGRAMMING LAB	0:0:4:2
3.	20XD23	DATA STRUCTURES AND ALGORITHMS	3:0:0:3
4.	20XD24	OBJECT ORIENTED PROGRAMMING	3:0:0:3
5.	20XD25	THEORY OF PROBABILITY	3:2:0:4
6.	20XD26	OBJECT COMPUTING LAB	0:0:4:2
7.	20XD27	DATA STRUCTURES LAB	0:0:4:2
8.	20XD28	PYTHON PROGRAMMING LAB	0:0:4:2
9.	20XD31	APPLIED STATISTICS	3:0:0:3
10.	20XD34	ADVANCED DATA STRUCTURES	3:0:0:3
11.	20XD35	COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING	3:2:0:4
12.	20XD36	APPLIED STATISTICS AND R PROGRAMMING LAB	0:0:4:2
13.	20XD37	ADVANCED DATA STRUCTURES LAB	0:0:4:2
14.	20XD38	JAVA PROGRAMMING LAB	0:0:4:2
15.	20XD41	OPTIMIZATION TECHNIQUES	4:0:0:4
16.	20XD42	DATABASE DESIGN	3:0:0:3
17.	20XD43	PREDICTIVE ANALYTICS	3:0:0:3

18.	20XD44	OPERATING SYSTEMS	3:2:0:4
19.	20XD46	DATA ANALYTICS AND VISUALIZATION LAB	0:0:4:2
20.	20XD47	RDBMS LAB	0:0:4:2
21.	20XD48	SCIENTIFIC COMPUTING LAB	0:0:4:2
22.	20XD51	DESIGN AND ANALYSIS OF ALGORITHMS	3:0:0:3
23.	20XD52	STOCHASTIC MODELS	4:0:0:4
24.	20XD53	COMPUTER NETWORKS	3:2:0:4
25.	20XD54	MACHINE LEARNING	3:0:0:3
26.	20XD56	DESIGN AND ANALYSIS OF ALGORITHMS LAB	0:0:4:2
27.	20XD57	MACHINE LEARNING LAB	0:0:4:2
28.	20XD58	CAPSTONE PROJECT	0:0:4:2
29.	20XD61	PARALLEL AND DISTRIBUTED COMPUTING	3:0:0:3
30.	20XD62	DEEP LEARNING	3:0:0:3
31.	20XD63	BIG DATA & MODERN DATABASE SYSTEMS	3:0:0:3
32.	20XD64	ARTIFICIAL INTELLIGENCE	3:2:0:4
33.	20XD66	PARALLEL AND DISTRIBUTED COMPUTING LAB	0:0:4:2
34.	20XD67	BIG DATA & MODERN DATABASE SYSTEMS LAB	0:0:4:2
35.	20XD68	DEEP LEARNING LAB	0:0:4:2
36.	20XD81	REINFORCEMENT LEARNING	3:0:0:3
37.	20XD82	NATURAL LANGUAGE PROCESSING	3:0:0:3
38.	20XD83	DATA MINING	3:0:0:3
39.	20XD86	REINFORCEMENT LEARNING LAB	0:0:4:2
40.	20XD87	NATURAL LANGUAGE PROCESSING LAB	0:0:4:2
41.	20XD88	DATA MINING LAB	0:0:4:2
42.	20XD91	DATA PRIVACY AND SECURITY	3:0:0:3
43.	20XD92	NETWORK SCIENCE	3:0:0:3
44.	20XD93	INFORMATION RETRIEVAL AND WEB SEARCH	3:0:0:3
45.	20XD96	INFORMATION RETRIEVAL & WEB SEARCH LAB	0:0:4:2
46.	20XD97	DATA PRIVACY AND SECURITY LAB	0:0:4:2
47.	20XD98	NETWORK SCIENCE LAB	0:0:4:2

PROFESSIONAL ELECTIVES (PE)					
Sl. No.	Course Code	Course Title	L:T:P:C	PREREQUISITES	Preferred Semester
1.	20XDA1	DATA COMPRESSION	3:2:0:4	20XD23, 20XD25, 20XD45	V
2.	20XDA2	MOBILE COMPUTING	3:2:0:4	20XD53	VI
3.	20XDA3	DIGITAL IMAGE PROCESSING	3:2:0:4	20XD11,20XD21,20XD25, 20XD32	VI
4.	20XDA4	MULTIMEDIA ANALYTICS	3:2:0:4	20XD54, 20XDA3	VIII
5.	20XDA5	COMPUTATIONAL NEUROSCIENCE	3:2:0:4	20XD12, 20XD33, 20XD52,20XD54	VIII
6.	20XDA6	PERVASIVE COMPUTING	3:2:0:4	20XD53, 20XD35	VIII
7.	20XDA7	MARKETING ANALYTICS	3:2:0:4	20XD54, 20XD43	VI
8.	20XDA8	WEB ANALYTICS	3:2:0:4	20XD54	VI
9.	20XDA9	COMPUTER GRAPHICS	3:2:0:4	20XD23, 20XD32	V
10.	20XDAA	ALGORITHMS FOR BIOINFORMATICS	3:2:0:4	20XD12, 20XD54	VI
11.	20XDAB	MATHEMATICAL MODELING	3:2:0:4	20XD41, 20XD43,20XD52	VI
12.	20XDAC	SOFTWARE ENGINEERING	3:2:0:4	20XD14	V
13.	20XDAD	SOFTWARE PATTERNS	3:2:0:4	20XDAC	VI
14.	20XDAE	APPLIED GRAPH ALGORITHMS	3:2:0:4	20XD33	IX
15.	20XDAF	GAME THEORY	3:2:0:4	20XD41	IX
16.	20XDAG	SOCIAL NETWORK DATA ANALYTICS	3:2:0:4	20XD33, 20XD34	IX
17.	20XDAH	HEALTH ANALYTICS	3:2:0:4	20XD54, 20XD82	IX
19.	20XDAI	CYBER SECURITY ANALYTICS	3:2:0:4	20XD54, 20XD82, 20XD83	IX
20.	20XDAJ	INTERNET OF THINGS	3:2:0:4	20XD44, 20XD53, 20XD61	VIII
21.	20XDAK	CLOUD COMPUTING	3:2:0:4	20XD61	VIII
22.	20XDAL	LARGE SCALE MACHINE LEARNING	3:2:0:4	20XD41, 20XD54	VI
24.	20XDAM	WIRELESS NETWORKS	3:2:0:4	20XD53	VI
25.	20XDAN	SURVIVAL ANALYTICS	3:2:0:4	20XD25,20XD52,20XD54	VI
26.	20XDAO	RANDOMIZED ALGORITHMS	3:2:0:4	20XD25, 20XD34, 20XD51,20XD52	VIII or IX

OPEN ELECTIVES (OE)					
S.No.	Course Code	Course Title	L:T:P:C	PREREQUISITES	Preferred Semester
1	20XDO1	COMPUTATIONAL FINANCE	3:2:0:4	20XD11, 20XD25, 20XD52	VIII or IX
2	20XDO2	COMPUTATIONAL GEOMETRY	3:2:0:4	20XD33, 20XD34	VIII or IX
3	20XDO3	PRINCIPLES OF MANAGEMENT AND BEHAVIOURAL SCIENCES	3:2:0:4	NA	VIII or IX
4	20XDO4	ENTREPRENEURSHIP	3:2:0:4		VIII or IX
5	20XDO5	INFORMATION THEORY AND ERROR CONTROL CODING	3:2:0:4	20XD25, 20XD32, 20XDA1	VIII or IX
6	20XDO6	ACCOUNTING AND FINANCIAL MANAGEMENT	3:2:0:4	NA	VIII or IX
7	20XDO7	ENVIRONMENTAL SCIENCE AND GREEN COMPUTING	3:2:0:4	NA	VIII or IX
8	20XDO8	FUNCTIONAL ANALYSIS	3:2:0:4	20XD22, 20XD32	VIII or IX
9	20XDO9	ADVANCED OPTIMIZATION TECHNIQUES	3:2:0:4	20XD32, 20XD41	VIII or IX

BASIC SCIENCES(BS)			
SI.No.	Course Code	Course Title	L:T:P:C
1.	20XD12	CALCULUS AND ITS APPLICATIONS	3:2:0:4
2.	20XD14	DIGITAL ELECTRONICS	3:0:0:3
3.	20XD18	DIGITAL ELECTRONICS LAB	0:0:4:2
4.	20XD21	DISCRETE STRUCTURES	3:2:0:4
5.	20XD22	ABSTRACT ALGEBRA	3:2:0:4
7.	20XD32	LINEAR ALGEBRA	4:0:0:4
8.	20XD33	GRAPH THEORY	3:2:0:4

ENGINEERING SCIENCES(ES)			
SI.No.	Course Code	Course Title	L:T:P:C
1.	20XD16	ENGINEERING GRAPHICS AND GEOMETRIC MODELING	0:0:4:2
2.	20XD13	BASICS OF COMPUTATIONAL BIOLOGY	3:2:0:4

HUMANITIES AND SOCIAL SCIENCES(HS)			
Sl. No.	Course Code	Course Title	L:T:P:C
1.	20XD11	ENGLISH FOR PROFESSIONAL SKILLS	3:0:0:3

EMPLOYMENT ENHANCEMENT COURSES (EEC)				
Sl.No.	Course Code	Course Title	L:P:T:C	Preferred Semester
1.	20XDP1	PROJECT WORK - I	0:0:0:12	VII
2.	20XDP2	PROJECT WORK – II	0:0:0:12	X