B Tech in Computer Science and Engineering (Data Science)
Dept. of Information Technology,

Manipal Institute of Technology, Bengaluru-560 064
Manipal Academy of Higher Education (MAHE)

B Tech Curriculum – 2023

Flexible Total Credits: 160/168/180/188

Mandatory Learning Courses (MLC): 12 Credits (2+9+1)

Flexible Core - Choice Based Credit System (CBCS)

Provisions for awarding credits to students for their performance in NCC and Major Projects (optional) - OEs

Scope for Component level Self Directed Learning (SDL) in a few courses

ACADEMIC YEAR	NO. OF CREDITS	REMARKS
FIRST	22 + 22 = 44	EG-I & EG-II – 1 credit each Universal Human Values & professional ethics– 1 credit Human Rights and Constitution – 1 credit
SECOND	22 + 21 = 43	ODD SEM: Core + Labs EVEN SEM: Core + Labs
THIRD	21 + 21 = 42	ODD SEM: FLEXIBLE Core + Labs + OE EVEN SEM: FLEXIBLE Core + OE + PEs + Labs CHOICE BASED CREDIT SYSTEM FOR CORE COURSES MANDATORY OE – CPI
FOURTH	18 + 13 = 31	ODD SEM: PEs + OE EVEN SEM: Project Work/Practice School, Industrial Training

Year	THIRD SEMESTER						FOURTH SEMESTER					
	Sub. Code	Subject Name	L	T	P	C	Sub. Code	Subject Name	L	T	P	C
II	MAT_2157	MATHEMATICAL FOUNDATIONS FOR DATA SCIENCE-I	3	0	0	3	MAT_2213	MATHEMATICAL FOUNDATIONS FOR DATA SCIENCE-II	2	1	0	3
	DS_ 2151	Computer Organization& Architecture	3	1	0	4	DS_ 2251	Formal Languages and Automata Theory	2	1	0	3
	DS_ 2152	Data Structures	3	1	0	4	DS_ 2252	Design and Analysisof Algorithms	3	1	0	4
	DS_ 2153	Digital System Design	3	1	0	4	DS_2253	Embedded Systems	3	1	0	4
	DS_ 2154	Object Oriented Programming	3	1	0	4	DS_ 2254	Database Systems	3	1	0	4
	DS_ 2161	Data Structures Lab	0	0	3	1	DS_ 2261	Database Systems Lab	0	0	3	1
	DS_ 2162	Digital System Design Lab	0	0	3	1	DS_ 2262	Algorithms Lab	0	0	3	1
	DS_ 2163	Object Oriented Programming Lab	0	0	3	1	DS_ 2263	Embedded Systems Lab	0	0	3	1
			14	5	9	22			14	5	9	21
	Total Contact Hours (L + T + P)		28				Total Contact Hours (L + T + P)		28			

Year		FIFTH SEMESTER						SIXTH SEMESTER					
	Sub. Code	Subject Name	L	T	P	C	Sub. Code	Subject Name	L	T	P	C
III	HUM_3052	Essentials of Management	3	0	0	3	HUM_3051	Engineering Economics & Financial Management	3	0	0	3
	DS_3151	Data Architecture	2	1	0	3	DS_3251	Mathematical models for Machine Learning	2	1	0	3
	DS_3152	Software Engineering	2	1	0	3	DS_3252	Big Data Analytics	2	1	0	3
	DS_3153	Web and Social Media Analytics	2	1	0	3	DS****	PE – 1 / Minor Specialization	3	0	0	3
	DS_3154	Data preprocessing and Visualization	2	1	0	3	DS ****	PE – 2 / Minor Specialization	3	0	0	3
	** ****	OE – Creativity, Problem Solving and Innovation** (MLC) -mandatory	3	0	0	3	** ****	OE – 1** (MLC)	3	0	0	3
	DS_3161	Software Engineering Lab	0	0	3	1	DS_3261	Machine Learning Lab	0	0	3	1
	DS_3163	Web and Social Media Analytics lab	0	0	3	1	DS_3262	Big data Analytics Lab	0	0	3	1
	DS_3162	Data Pre-processing and Visualization Lab	0	0	3	1	DS_3263	Web Programming Lab	1	0	2	1
			14	**4**	**9**	**21**			**17**	**2**	**8**	**21**
	Total Contact Hours (L + T + P)		**27**				Total Contact Hours (L + T + P)		**27**			

** Performance of students to be recorded in Eighth semester grade sheet.

Year	SEVENTH SEMESTER						EIGHTH SEMESTER					
	Sub. Code	Subject Name	L	T	P	C	Sub. Code	Subject Name	L	T	P	C
IV		PE – 3 / Minor Specialization	3	0	0	3	DS_4201	Industrial Training (MLC)				1
		PE – 4 / Minor Specialization	3	0	0	3	DS_4202	Project Work				12
		PE – 5	3	0	0	3	DS_4203	Project Work (B Tech – honours) *(V - VIII sem)				20
		PE – 6	3	0	0	3		B Tech – honours Theory – 1* (V semester)				4
		PE - 7	3	0	0	3		B Tech – honours Theory – 2* (VI semester)				4
		OE – 2** (MLC)	3	0	0	3		B Tech – honours Theory – 3* (VII semester)				4
		Mini Project (Minor specialization) ***				8						
			18	0	0	18/26***						13/33*
	Total Contact Hours (L + T + P)		**18**				**Total Contact Hours (L + T + P)**					

*Applicable to eligible students who opted for and successfully completed the B Tech – honoursrequirements

** Performance of students to be recorded in Eighth semester grade sheet.

***Applicable to students who opted for minor specialization

MINOR SPECIALIZATIONS	PROGRAMME ELECTIVES	DS_4047 Storage Device andTechnology
I. DATA ANALYTICS DS_4001Data Warehousing &Data Mining DS_4002Information Retrieval DS_4003 Machine Learning for DataAnalytics DS_4004 Semantic web	DS_4021 Data Stream Mining DS_4022 Video Analytics DS_4023 Web Security DS_4024 Exploratory data analysis DS_4025 Mining massive datasets	DS_4048 Parallel computerarchitecture and programming DS_4049 Fundamentals Of QuantumComputing
II. INTERNET OF THINGS DS_4005 Introduction to IoT DS_4006 IoT in Agriculture DS_4007 IoT for Healthcare DS_4008 Smart Cities	DS_4026 Database Security DS_4027 Predictive Analytics DS_4028 Data warehousing & DS_4029 Businessintelligence DS_4030 Artificial intelligence DS_4031 Datamining	**OPEN ELECTIVES** DS_4050 Essentials of IndustrialComputing DS_4051 Essentials of IT DS_4052 Linux Programming DS_4053 Principles of DatabaseSystems
III. ENTREPRENEURSHIP HUM_4051 Financial Management HUM_***Entrepreneurship HUM_***Design Thinking HUM_***Intellectual Property Management	DS_4032 Distributed Systems DS_4033 Pervasive Computing DS_4034 Android Application Development DS_4035 Ethical Hacking and CyberSecurity	DS_4054 Principles of SoftwareEngineering DS_4055 Python Programming DS_4056 Web Programming
IV FINTECH HUM_**** Financial Economics HUM_**** Financial Management HUM_**** Fintech Services HUM_**** Technologies for Services	DS_4036 Information Retrieval DS_4037 Multimedia Retrieval DS_4038 Cloud Computing DS_4039 Deep Learning DS_4040 Human Computer Interface	**Note:** B. Tech Honors students must take 3 additional theory courses of 12 credits and an additional research project of 8 credits so as to accumulate 20 credits.
COURSERA COURSES DS_4017 Big Data Modelling and Management Systems DS_4018 Big Data Integration and Processing DS_4019 Machine Learning with Big Data DS_4020 Graph Analytics for Big Data	DS_4041 Multimedia Technologies DS_4042 Social Network Analysis DS_4043 Software Architecture DS_4044 UML and Design Patterns DS_4045 Software Testing and Analysis DS_4046 Software Defined Networks	**The additional theory courses:** 1.DS_5022 Advanced Machine Learning 2. DS_5023 Pattern Recognition 3. DS_5024 Advanced Cryptography