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

FIRST YEAR B Tech CURRICULUM 2022 (Common to all branches)

PHYSICS CYCLE

Year	FIRST SEMESTER						SECOND SEMESTER					
	Sub. Code	Subject Name	L	T	P	C	Sub. Code	Subject Name	L	T	P	C
I		Engineering mathematics - I	3	1	0	4		Engineering mathematics - II	3	1	0	4
		Engineering Physics	2	1	0	3		Engineering Chemistry	2	1	0	3
		Mechanics of Solids	2	1	0	3		Biology for Engineers	3	0	0	3
		Basic Electronics	2	1	0	3		Basic Electrical Technology	2	1	0	3
		Basic Mechanical Engineering	2	1	0	3		Problem Solving Using Computers	2	1	0	3
		Communication Skills in English	2	0	0	2		Environmental Studies	2	0	0	2
		Universal Human Values and Professional Ethics (MLC)	1	0	0	1		Human Rights and Constitution (MLC)	1	0	0	1
		Engineering Physics Lab	0	0	3	1		Engineering Chemistry Lab	0	0	3	1
		Workshop Practice	0	0	3	1		PSUC Lab	0	0	3	1
		Engineering Graphics - I	0	0	3	1		Engineering Graphics - II	0	0	3	1
		Creativity, Problem Solving & Innovation*(MLC)	1	0	0	--*		Creativity, Problem Solving & Innovation* (MLC)	1	0	0	--*
			15	5	9	22			16	4	9	22
	Total Contact Hours (L + T + P)			29			**Total Contact Hours (L + T + P)**			29		

*After completing a project work along with other activities which are assessed periodically the students would earn 3 credits which would be considered in lieu of an open elective for Fifth semester B Tech

FIRST YEAR B Tech CURRICULUM 2022 (Common to all branches)

CHEMISTRY CYCLE

Year	Sub. Code	FIRST SEMESTER Subject Name	L	T	P	C	Sub. Code	SECOND SEMESTER Subject Name	L	T	P	C
		FIRST SEMESTER						SECOND SEMESTER				
	Sub. Code	Subject Name	L	T	P	C	Sub. Code	Subject Name	L	T	P	C
I		Engineering mathematics - I	3	1	0	4		Engineering mathematics - II	3	1	0	4
		Engineering Chemistry	2	1	0	3		Engineering Physics	2	1	0	3
		Biology for Engineers	3	0	0	3		Mechanics of Solids	2	1	0	3
		Basic Electrical Technology	2	1	0	3		Basic Electronics	2	1	0	3
		Problem Solving Using Computers	2	1	0	3		Basic Mechanical Engineering	2	1	0	3
		Environmental Studies	2	0	0	2		Communication Skills in English	2	0	0	2
		Human Rights and Constitution (MLC)	1	0	0	1		Universal Human Values and Professional Ethics (MLC)	1	0	0	1
		Engineering Chemistry Lab	0	0	3	1		Engineering Physics Lab	0	0	3	1
		PSUC Lab	0	0	3	1		Workshop Practice	0	0	3	1
		Engineering Graphics – I	0	0	3	1		Engineering Graphics - II	0	0	3	1
		Creativity, Problem Solving & Innovation (MLC)*	1	0	0	--*		Creativity, Problem Solving & Innovation (MLC)*	1	0	0	--*
			16	4	9	22			15	5	9	22
	Total Contact Hours (L + T + P)		29				Total Contact Hours (L + T + P)		29			

*After completing a project work along with other activities which are assessed periodically the students would earn 3 credits which would be considered in lieu of the open elective for Fifth semester B Tech

B Tech in Computer Science and Engineering (Data Science)

Year	Sub. Code	THIRD SEMESTER Subject Name	L	T	P	C	Sub. Code	FOURTH SEMESTER Subject Name	L	T	P	C
II		Introduction to Statistics	2	1	0	3		Probability and Linear Algebra	2	1	0	3
		Computer Organization & Architecture	3	1	0	4		Formal Languages and Automata Theory	2	1	0	3
		Data Structures	3	1	0	4		Design and Analysis of Algorithms	3	1	0	4
		Digital System Design	3	1	0	4		Embedded Systems	4	1	0	4
		Object Oriented Programming	3	1	0	4		Database Systems	3	1	0	4
		Data Structures Lab	0	0	3	1		Database Systems Lab	0	0	3	1
		Digital System Design Lab	0	0	3	1		Algorithms Lab	0	0	3	1
		Object Oriented Programming Lab	0	0	3	1		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**			

B Tech in Computer Science and Engineering (Data Science)

Year	Sub. Code	Subject Name (FIFTH SEMESTER)	L	T	P	C	Sub. Code	Subject Name (SIXTH SEMESTER)	L	T	P	C
		FIFTH SEMESTER						**SIXTH SEMESTER**				
III		Essentials of Management	3	0	0	3		Engineering Economics & Financial Management	3	0	0	3
		Data Architecture	2	1	0	3		Mathematical models for Machine Learning	2	1	0	3
		Software Engineering	2	1	0	3		Big Data Analytics	2	1	0	3
		Web and Social Media Analytics	2	1	0	3		PE – 1 / Minor Specialization	3	0	0	3
		Data prepressing and Visualization	2	1	0	3		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
		Software Engineering Lab	0	0	3	1		Machine Learning Lab	0	0	3	1
		Web and Social Media Analytics lab	0	0	3	1		Big data Analytics Lab	0	0	3	1
		Data Pre-processing and Visualization Lab	0	0	3	1		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.

B Tech in Computer Science and Engineering (Data Science)

Year	Sub. Code	Subject Name (SEVENTH SEMESTER)	L	T	P	C	Sub. Code	Subject Name (EIGHTH SEMESTER)	L	T	P	C
IV		PE – 3 / Minor Specialization	3	0	0	3		Industrial Training (MLC)				1
		PE – 4 / Minor Specialization	3	0	0	3		Project Work				12
		PE – 5	3	0	0	3		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 – honours requirements

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

***Applicable to students who opted for minor specialization

MINOR SPECIALIZATIONS

I. INTERNET OF THINGS
1. Introduction to IoT
2. IoT in Agriculture
3. IoT for Healthcare
4. Smart Cities

II. DATA ANALYTICS
1. Data Warehousing &Data Mining
2. Information Retrieval
3. Machine Learning for Data Analytics
4. Semantic web

III. ENTREPRENEURSHIP
1. Financial Management
2. Entrepreneurship
3. Design Thinking
4. Intellectual Property Management

IV FINTECH
1. Financial Economics
2. Financial Management
3. Fintech Services
4. Technologies for Services

COURSERA COURSES
1. Big Data Modelling and Management Systems
2. Big Data Integration and Processing
3. Machine Learning with Big Data
4. Graph Analytics for Big Data

PROGRAMME ELECTIVES
1. Data Stream Mining
2. Video Analytics
3. Web Security
4. Exploratory data analysis
5. Mining massive datasets
6. Database Security
7. Predictive Analytics
8. Data warehousing & Business intelligence
9. Artificial intelligence
10. Datamining
11. Distributed Systems
12. Pervasive Computing
13. Android Application Development
14. Ethical Hacking and Cyber Security
15. Information Retrieval
16. Multimedia Retrieval
17. Cloud Computing
18. Deep Learning
19. Human Computer Interface
20. Multimedia Technologies
21. Social Network Analysis
22. Software Architecture
23. UML and Design Patterns
24. Software Testing and Analysis
25. Software Defined Networks
26. Storage Device and Technology
27. Parallel computer architecture and programming
28. Fundamentals Of Quantum Computing

OPEN ELECTIVES
1. Essentials of Industrial Computing
2. Essentials of IT
3. Linux Programming
4. Principles of Database Systems
5. Principles of Software Engineering
6. Python Programming
7. Web Programming

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.

The additional theory courses:
1. Advanced Machine Learning
2. Pattern Recognition
3. Advanced Cryptography