BTECH COMPUTER SCIENCE AND ENGINEERING SPECIALIZATION IN ARTIFICIAL INTELLIGENCE & DATA SCIENCE

COURSE STRUCTURE

EFFECTIVE: 2025-26 ADMISSION BATCH

Approved in Academic Council held on 30 July 2025

B.TECH. COMPUTER SCIENCE AND ENGINEERING

PROGRAM OBJECTIVES

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

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PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

FIRST SEMESTER

S. No.	Course			Contact Hours				Credits
	Category	Course Code	Course Title	L	T	P	Total	
1	BSC	25B11MA113	Mathematics-I	3	1	0	4	4
2	BSC	25B11PH111	Physics-I	3	1	0	4	4
3	BSC	25B17PH171	Physics Lab-I	0	0	2	2	1
4	ESC	25B11CI11	Software Development Fundamentals-I	3	1	0	4	4
5	ESC	25B17CI172	Software Development Fundamentals Lab-I	0	0	2	2	1
6	ESC	25B11EC111	Basic Electronics	3	1	0	4	4
7	ESC	25B17EC171	Basic Electronics Lab	0	0	2	2	1
8	HSC	25B11HS111	English	1	0	2	3	2
9	ESC	25B17GE171	Workshop	0	0	3	3	1.5
			Total				**28**	**22.5**

SECOND SEMESTER

S. No.	Course			Contact Hours				Credits
	Category	Course Code	Course Title	L	T	P	Total	
1	BSC	25B11MA21	Mathematics-II	3	1	0	4	4
2	BSC	25B11PH211	Physics-II	3	1	0	4	4
3	BSC	25B17PH271	Physics Lab-II	0	0	2	2	1
4	ESC	25B11CI211	Software Development Fundamentals-II	3	1	0	4	4
5	ESC	25B17CI271	Software Development Fundamentals Lab-II	0	0	2	2	1
6	HSC	25B17HS271	Life Skills & Professional Communication Lab	0	0	2	2	Qualifying
7	ESC	25B17GE172	Engineering Drawing & Design	0	0	3	3	1.5
8	HSC	25B11HS211	Universal Human Values (UHV)	2	1	0	3	3
			Total				**24**	**18.5**

THIRD SEMESTER

S. No.	Course			Contact Hours				Credits
	Category	Course Code	Course Title	L	T	P	Total	
1	BSC		Mathematical Foundations for Artificial Intelligence and Data Science	3	1	0	4	4
2	PCC		Theory of Computation	3	0	0	3	3
3	PCC		Data Structures	3	1	0	4	4
4	PCC		Data Structures Lab	0	0	2	2	1
5	PCC		Database Management Systems	3	0	0	3	3
6	PCC		Database Management Systems Lab	0	0	2	2	1
7	PCC		Unix Programming Lab	1	0	2	3	2
8	PCC		Object Oriented Programming using Java	0	0	2	2	1
9	HSC		Economics	2	1	0	3	3
10	PRC		Summer Training-I (4 weeks)*	0	0	0	0	2
11	PCC		Competitive Programming-I	0	0	2	2	1
Total							**28**	**25**
Specialization in Artificial Intelligence and Data Science (AI&DS)								
12	PCC		Computational Fundamentals for Optimization	3	0	0	3	3
13	PCC		Computational Fundamentals for Optimization Lab	0	0	2	2	1
Total							**33**	**29**

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FOURTH SEMESTER

S. No.	Course			Contact Hours				Credits
	Category	Course Code	Course Title	L	T	P	Total	
1	HSC		HSS Elective – 1	2	1	0	3	3
2	PCC		Digital Systems and Computer Organisation	3	0	0	3	3
	PCC		Digital Systems and Computer Organisation Lab	0	0	2	2	1
3	PCC		Design and Analysis of Algorithms	3	1	0	4	4
4	PCC		Design and Analysis of Algorithms Lab	0	0	2	2	1
5	PCC		Artificial Intelligence and Machine Learning	3	0	0	3	3
6	PCC		Artificial Intelligence and Machine Learning Lab	0	0	2	2	1
7	PCC		Software Engineering	3	0	0	3	3
8	PCC		Competitive Programming-II	0	0	2	2	1
9	PEC		Discipline Elective – 1	2	0	0	2	2
10	PEC		Discipline Elective – 1 Lab	0	0	2	2	1
11	OMC		Environmental Studies	3	0	0	3	Qualifying
Total							**31**	**23**
Specialization in Artificial Intelligence and Data Science (AI&DS)								
12	PCC		Artificial Intelligence: Recent Trends and Applications	3	0	0	3	3
13	PCC		Artificial Intelligence: Recent Trends and Applications Lab	0	0	2	2	1
Total							**36**	**27**

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FIFTH SEMESTER

S. No.	Course			Contact Hours				Credits
	Category	Course Code	Course Title	L	T	P	Total	
1	PCC		Operating Systems	3	0	0	3	3
2	PCC		Operating Systems Lab	0	0	2	2	1
3	PCC		Computer Networks	3	1	0	4	4
4	PCC		Computer Networks Lab	0	0	2	2	1
5	PCC		Full Stack Development Lab	0	0	2	2	1
6	PEC		Discipline Elective – 2	2	0	0	2	2
7	PEC		Discipline Elective – 2 Lab	0	0	2	2	1
8	PEC		Discipline Elective – 3	2	0	0	2	2
9	PEC		Discipline Elective – 3 Lab	0	0	2	2	1
10	BSC		Science Elective	3	0	0	3	3
11	OMC		Indian Constitution & Traditional Knowledge	3	0	0	3	Qualifying
12	PRC		Summer Training-II (6 weeks) *	0	0	0	0	2
13	PCC		Competitive Programming-III	0	0	2	2	1
14	HSC		Logical and Quantitative Techniques-I	2	0	0	2	2
Total							**31**	**24**
Specialization in Artificial Intelligence and Data Science (AI&DS)								
15	PCC		Intelligent Techniques for Predictive Data Analytics	3	0	0	3	3
16	PCC		Intelligent Techniques for Predictive Data Analytics Lab	0	0	2	2	1
Total							**36**	**28**

SIXTH SEMESTER

S. No.	Course			Contact Hours				Credits
	Category	Course Code	Course Title	L	T	P	Total	
1	PCC		Web Technology	3	0	0	3	3
2	PCC		Web Technology Lab	0	0	2	2	1
3	PCC		Advanced Data Structures and Algorithms	3	0	0	3	3
4	PCC		Advanced Data Structures and Algorithms Lab	0	0	2	2	1
5	PCC		Distributed and Cloud Computing **OR** Information Security and Cryptography	3	0	0	3	3
6	PEC		Discipline Elective – 4	3	0	0	3	3
7	PEC		Discipline Elective – 5	3	0	0	3	3
8	OEC		Open Elective – 1	2	0	0	2	2
9	Value Added		Selected Value-Added Course	2	0	0	2	Audit
10	HSC		Soft Skills for Employability	0	0	2	2	1
11	PRC		Minor Project	0	0	4	4	2
12	HSC		Logical and Quantitative Techniques-II	2	0	0	2	2
			Total				**31**	**24**
Specialization in Artificial Intelligence and Data Science (AI&DS)								
13	PCC		Introduction to Data Analytics and Visualization	3	0	0	3	3
14	PCC		Statistical Analysis and Computing	3	0	0	3	3
			Total				**37**	**30**

SEVENTH SEMESTER

S. No.	Course			Contact Hours				Credits
	Category	Course Code	Course Title	L	T	P	Total	
1	PEC		Discipline Elective – 6	3	0	0	3	3
2	OEC		Open Elective – 2	3	0	0	3	3
3	PRC		Major Project Part – 1	0	0	0	8	4
4	PRC		Summer Training - III (6 weeks) *	0	0	0	0	4
			Total				**14**	**14**

EIGHTH SEMESTER

S. No.	Course			Contact Hours				Credits
	Category	Course Code	Course Title	L	T	P	Total	
1	PEC		Discipline Elective –7	3	0	0	3	3
2	OEC		Open Elective –3	3	0	0	3	3
3	PRC		Major Project Part –2	0	0	0	16	8
			Total				**22**	**14**

***To be completed during the summer vacation.**

Total Program Credits: 22.5 + 18.5 + 29 + 27 + 28 + 30 + 14 + 14 = 183

Bucket Wise Tentative List of Discipline Electives **(To be updated time to time)**

Discipline Elective – 1 and Discipline Elective – 1 Lab (offered in 4th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1		Data Analytics using R and Python	2	0	0	2	2
2		Mobile Application Development	2	0	0	2	2
3		Fundamentals of Smart Systems and IoT	2	0	0	2	2
4		Introduction to Compiler Design	2	0	0	2	2
5		Data Analytics using R and Python Lab	0	0	2	2	1
6		Mobile Application Development Lab	0	0	2	2	1
7		Fundamentals of Smart Systems and IoT Lab	0	0	2	2	1
8		Introduction to Compiler Design Lab	0	0	2	2	1

Discipline Elective – 2 and Discipline Elective – 2 Lab (offered in 5th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1		Fundamentals of Soft Computing	2	0	0	2	2

2		Fundamentals of Computer and Cyber Security	2	0	0	2	2
3		Data Mining and Data Warehousing	2	0	0	2	2
4		Agile Software Development Process	2	0	0	2	2
5		IoT Analytics	2	0	0	2	2
6		Fundamentals of Soft Computing Lab	0	0	2	2	1
7		Fundamentals of Computer and Cyber Security Lab	0	0	2	2	1
8		Data Mining and Data Warehousing Lab	0	0	2	2	1
9		Agile Software Development Process Lab	0	0	2	2	1
10		IoT Analytics Lab	0	0	2	2	1

Discipline Elective – 3 and Discipline Elective – 3 Lab (offered in 5th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1		Image Processing and Computer Vision	2	0	0	2	2
2		Introduction to Blockchain Technology	2	0	0	2	2
3		Computing for Data Science	2	0	0	2	2
4		Sensor Technology & Android Programming	2	0	0	2	2
5		Concept of Graph Theory	2	0	0	2	2
6		Image Processing and Computer Vision Lab	0	0	2	2	1
7		Introduction to Blockchain Technology Lab	0	0	2	2	1
8		Computing for Data Science Lab	0	0	2	2	1
9		Sensor Technology & Android Programming Lab	0	0	2	2	1
10		Concept of Graph Theory Lab	0	0	2	2	1

Discipline Elective – 4 (offered in 6th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	18B12CS428	Introduction to Deep Learning	3	0	0	3	3
2	22B12CS419	Cryptocurrency Technologies	3	0	0	3	3
3	16B1NCI648	Information Retrieval and Semantic Web	3	0	0	3	3
4	22B12CS422	Cloud Computing Essentials: Azure and AWS	3	0	0	3	3

Discipline Elective – 5 (offered in 6th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	21B12CS417	Machine Learning and Big Data	3	0	0	3	3
2	21B12CS415	Secure Design of Software Systems	3	0	0	3	3
3	21B12CS413	Fog and Edge Computing	3	0	0	3	3

Discipline Elective – 6 (offered in 7th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	17B1NCI731	Machine Learning and Natural Language Processing	3	0	0	3	3
2	21B12CS418	Ethical Hacking & Prevention	3	0	0	3	3
3	21B12CS314	Introduction to Large Scale Database Systems	3	0	0	3	3
4	19B12CS427	Introduction to DevOps	3	0	0	3	3
5	22B12CS411	Industrial Automation and IOT	3	0	0	3	3

Discipline Elective – 7 (offered in 8th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	22B12CS415	AI for Healthcare & Smart Systems	3	0	0	2	3
2	22B12CS412	Digital Forensics and Cyber Laws	3	0	0	2	3
3	15B1NCI732	Social Network Analysis	3	0	0	2	3
4	22B12CS420	Software Construction using Kubernetics and Micro-services	3	0	0	3	3

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