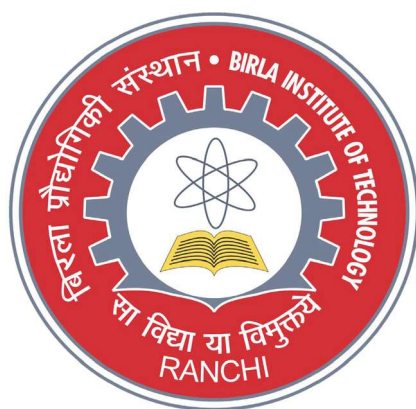


# **BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**



## **M.Sc. (Artificial Intelligence & Data Science)**

**CURRICULUM  
BASED ON NATIONAL EDUCATION POLICY 2020  
(Effective from Academic Session: 2025-26)  
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

## **Institute Vision**

To become a Globally Recognized Academic Institution in consonance with the social, economic and ecological environment, striving continuously for excellence in education, research and technological service to the National needs.

## **Institute Mission**

- To educate students at Undergraduate, Postgraduate, Doctoral, and Post-Doctoral levels to perform challenging engineering and managerial jobs in industry.
- To provide excellent research and development facilities to take up Ph.D. programmes and research projects.
- To develop effective teaching and learning skills and state of art research potential of the faculty.
- To build national capabilities in technology, education and research in emerging areas.
- To provide excellent technological services to satisfy the requirements of the industry and overall academic needs of society.

## **Department Vision**

The department strives to be recognized globally for outstanding education and research, leading to excellent professionals and innovators in the field of Computer Science and Engineering, who can positively contribute to the society.

## **Department Mission**

1. To impart quality education and equip the students with a strong foundation that could make them capable of handling challenges of the new century.
2. To maintain state of the art research facilities and facilitate interaction with world's leading universities, industries and research organizations for constant improvement in the quality of education and research.

## **Programmer Educational Objectives (PEOs)**

1. To develop expertise in artificial intelligence and data science techniques for solving complex real-world problems.
2. To prepare students for higher education, research, and innovation in AI and data science fields.
3. To instill ethical and responsible AI practices while fostering teamwork and leadership skills.
4. To cultivate a spirit of innovation and entrepreneurship for contributing to societal and technological advancements.

## **Program Outcomes (POs)**

### **1. Fundamentals of AI and Data Science**

Acquire in-depth knowledge of artificial intelligence, machine learning, and data science methodologies, integrating advanced theoretical and practical insights. Develop the ability to analyze, synthesize, and apply this knowledge for innovation and problem-solving in multidisciplinary domains.

### **2. Critical Thinking**

Develop analytical skills to evaluate complex data-driven problems and apply AI models to derive meaningful insights for decision-making.

### **3. Problem Solving**

Formulate AI-based solutions by integrating statistical, mathematical, and computational techniques while considering ethical and societal factors.

### **4. Research Skills**

Gain expertise in conducting research using advanced AI methodologies, data analytics tools, and experimental design to drive innovation in the field.

### **5. Usage of Modern Tools**

Proficiency in modern AI frameworks, machine learning libraries, big data technologies, and cloud computing tools for effective implementation of AI solutions.

### **6. Collaborative and Multidisciplinary Work**

Ability to work in interdisciplinary teams, leveraging AI and data science to address challenges across various domains such as healthcare, finance, and automation.

### **7. Project Management and Finance**

Develop knowledge of AI-driven project management, resource allocation, and financial considerations in AI-based businesses and research projects.

### **8. Communication**

Communicate technical concepts effectively to diverse audiences through research publications, presentations, and technical documentation.

### **9. Life-long Learning**

Recognize the importance of continuous learning to stay updated with emerging AI and data science trends, methodologies, and ethical considerations.

### **10. Ethical Practices and Social Responsibility**

Understand and implement AI solutions responsibly, ensuring transparency, fairness, and sustainability in data-driven decision-making.

### **11. Independent and Reflective Learning**

Critically evaluate AI models, assess outcomes, and refine approaches based on empirical evidence and ethical considerations.

## **Program Specific Outcomes (PSOs)**

Upon successful completion of the program, a graduate shall:

1. Develop expertise in AI techniques such as deep learning, natural language processing, and computer vision for solving industry and research problems.
2. Apply advanced data science methodologies for predictive analytics, data visualization, and decision-making across various domains.
3. Demonstrate the ability to work independently or in teams, effectively communicating AI-driven insights and solutions in both academic and industry settings.



**BIRLA INSTITUTE OF TECHNOLOGY-  
MESRA, RANCHI  
COURSE STRUCTURE FOR  
MASTER OF SCIENCE (AI & DS)  
(w.e.f. Academic Session 2025-26)  
(Proposed)**

Semester /Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T-Tutorial. P-Practical			Total Credits C
					L	T	P	C
			THEORY					
First Monsoon	Fourth	PC	SC25451	Data Structures and Algorithms	3	0	0	3
		PC	SC25453	Database Design Concepts	3	0	0	3
		PC	SC25455	Programming for AI and DS	3	0	0	3
		PC	SC25457	Operating Systems Concepts	3	0	0	3
		PC	SC25459	Mathematics for AI & Data Science	3	0	0	3
			LABORATORIES					
		PC	SC25452	Data Structures and Algorithms Lab	0	0	3	1.5
		PC	SC25454	Database Design Lab	0	0	3	1.5
		PC	SC25456	AI and DS Programming Lab	0	0	3	1.5
		HSS	HS24131	Communication Skills-I	0	0	3	1.5
		21						

Semester /Session of Study (Recomm ended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T- Tutorial. P-Practical			Total Credits C	
					L	T	P	C	
			THEORY						
Second Spring	Fourth	PC	SC25461	Artificial Intelligence and Machine Learning	3	0	0	3	
		PC	SC25463	Design & Analysis of Algorithms	3	0	0	3	
		PC	SC25465	Data Science and Applications	3	0	0	3	
		PE		PE - I	3	0	0	3	
		PE		PE – II	3	0	0	3	
		LABORATORIES							
		PC	SC25462	AI and ML Lab	0	0	3	1.5	
		PC	SC25464	Design & Analysis of Algorithms Lab	0	0	3	1.5	
		PE		PE - I Lab	0	0	3	1.5	
		HSS	HS24133	Communication Skills-II	0	0	3	1.5	
		21							

Semester /Session of Study (Recomm ended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T- Tutorial. P-Practical			Total Credits C
					L	T	P	C
			THEORY					
Third Monsoon	Fifth	PC	SC25501	Deep Learning and Applications	3	1	0	4
		PC	SC25503	Data Mining Techniques	3	0	0	3
		PC	SC25505	Natural Language Processing and Applications	3	0	0	3
		PE		PE – III	3	0	0	3
		LABORATORIES						
		PC	SC25502	Deep Learning Applications Lab	0	0	3	1.5
		PC	SC25504	Data Mining Techniques Lab	0	0	3	1.5
		PE		PE- III Lab	0	0	3	1.5
		SSC/OE	SC25506	Minor Project / MOOC	0	0	0	3
	20.5							

Semester /Session of Study (Recommended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery and credits L-Lecture; T-Tutorial; P-Practical			Total Credits C
					L	T	P	C
Fourth Spring	Fifth	Project	SC25520	Capstone Project/ Internship	0	0	0	20
								<b>20</b>

PC: Programme Core  
SSC : Soft Skill Course

PE: Programme Elective  
OE: Open Elective

HSS: Humanities and Social Sciences

### List of Program Electives

Course Level	Course Code	Courses	Mode of delivery and credits L-Lecture; T-Tutorial. P-Practical			Total Credits C
			L	T	P	C
PE - I	SC25471	Advanced Software Engineering	3	0	0	3
	SC25473	Full Stack Development	3	0	0	3
	SC25475	Cloud Computing	3	0	0	3
	SC25472	Software Engineering Lab	0	0	3	1.5
	SC25474	Full Stack Development Lab	0	0	3	1.5
	SC25476	Cloud Computing Lab	0	0	3	1.5
PE - II	SC25477	Internet of Things and Application	3	0	0	3
	SC25479	Cyber Security	3	0	0	3
	SC25481	Blockchain Technology	3	0	0	3
PE - III	SC25507	Big Data Analytics	3	0	0	3
	SC25509	Information Retrieval	3	0	0	3
	SC25511	Computer Vision and Applications	3	0	0	3
	SC25508	Big Data Analytics Lab	0	0	3	1.5
	SC25510	Information Retrieval Lab	0	0	3	1.5
	SC25512	Computer Vision Lab	0	0	3	1.5