

BIRLA INSTITUTE OF TECHNOLOGY



**CHOICE BASED CREDIT SYSTEM (CBCS) CURRICULUM
(Effective from Academic Session: Monsoon 2023)**

**BACHELOR OF TECHNOLOGY IN ARTIFICIAL INTELLIGENCE
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 Under Graduate, Post Graduate, 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 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 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 organization for constant improvement in the quality of education and research.

Programme Educational Objectives (PEOs)

1. PEO 1: The program will produce graduates who will be competent professionals in IT industry, academics, government or entrepreneurs.
2. PEO 2: Graduates will exhibit professional ethics, critical thinking, problem solving and effective communication skills to work collaboratively in a team based environment.

3. PEO 3: The graduates will possess leadership qualities and will be capable of attaining higher positions in their professional career.
4. PEO 4: Graduates will be able to adapt to the fast changing world of technology and will become effective professionals to address the technical, social and business challenges.
5. PEO 5: Graduates will recognize the importance of interdisciplinary learning, engage in lifelong learning and professional development.

(A) Programme Outcomes (POs)

Graduates will be able to:

1. **Discipline knowledge:** Demonstrate the comprehensive knowledge of mathematics, computing fundamentals and domain concepts to enhance their professional skills.
2. **Problem analysis:** Apply to identify, formulate and analyze solutions to various computing problems using the fundamental principles of computing.
3. **Design/development of solutions:** Ability to design, develop and implement computer based solutions to real world problems using appropriate tools and techniques.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to challenging problems.
6. **The graduates and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the IT professionals
7. **Environment and sustainability:** Understand the impact of the professional computer based solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles to maintain the integrity in a working environment in sustainable societal development through objective, unbiased and truthful actions.
9. **Individual and team work:** Ability to work effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Express thoughts and ideas effectively in understanding computing activities by writing effective reports, making effective presentations, constructing documentation and presenting complex information in a concise manner.
11. **Project management:** Learn to build a project from pre-implementation to completion within constraints in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

(B) Programme Specific Outcomes (PSOs)

1. The ability to analyze, design, code and test application specific or complex problems in Cryptography and Network Security, Design and Analysis of Algorithm, Computer Networks, Cloud Computing, Mobile Computing, Data Mining and Big Data by applying the knowledge of basic sciences, mathematics and fundamentals.

2. The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional practice through life-long learning.

3. Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

BIRLA INSTITUTE OF TECHNOLOGY- MESRA, RANCHI
NEW COURSE STRUCTURE - To be effective from academic session 2023 – 24
BTECH IN ARTIFICIAL INTELLIGENCE
Based on CBCS system & OBE model Recommended scheme of study

Course Level	Semester of Study (Recommended)	Course Code	CourseName	Mode of delivery & credits <i>L-Lecture; T-Tutorial; P-Practicals</i>			Total Credits <i>C- Credits</i>
				L <i>(Periods /week)</i>	T <i>(Periods /week)</i>	P <i>(Periods /week)</i>	
FIRST	FS	MA 103	Mathematics - I	3	1	0	4
		CH101	Chemistry	3	1	0	4
	GE	EC101	Basic of Electronics and Communication Engineering	3	1	0	4
		ME101	Basic of Mechanical Engineering	3	1	0	4
	FS	CE101	Environmental Sciences	2	0	0	2
	LABORATORIES						
	FS	CH102	Chemistry Lab	0	0	3	1.5
	GE	EC102	Electronics and Communication Lab	0	0	3	1.5
		ME102	Engineering Graphics	0	0	4	2
	MC	MC101/102 /103/104	Choice of :NCC/NSS/ PT & Games/ Creative Arts (CA)	0	0	2	1
TOTAL (Theory + Labs)							24
SECOND	THEORY						
	FS	MA107	Mathematics - II	3	1	0	4
		PH113	Physics	3	1	0	4
		BE101	Biological Science for Engineers	2	0	0	2
	GE	CS101	Programming for problem Solving	3	1	0	4
EE101		Basics of Electrical Engineering	3	1	0	4	

LABORATORIES						
HSS	MT132	Communication Skills - I	0	0	3	1.5
FS	PH114	Physics Lab	0	0	3	1.5
GE	CS102	Programming for Problem Solving Lab	0	0	3	1.5
	PE101	Workshop Practice	0	0	3	1.5
MC	MC105/106/ 107/108	Choice of :NCC/NSS/ PT & Games/ Creative Arts (CA)	0	0	2	1
TOTAL (Theory + Labs)						25
THIRD						
THEORY						
PC						
	MA205	Discrete Mathematics	3	1	0	4
	EC203	Digital System Design	3	0	0	3
	CS231	Data Structures	3	1	0	4
	CS233	Object Oriented Programming and Design Pattern	3	0	0	3
	CS235	Computer Organization and Architecture	3	0	0	3
LABORATORIES						
PC	EC204	Digital System Design Lab	0	0	3	1.5
	CS232	Data Structures Lab	0	0	3	1.5
	CS234	OOPDP Lab	0	0	3	1.5
GE	EE102	Electrical Engineering Lab	0	0	3	1.5
MC	MC201/202/ 203/204	Choice of:NCC/NSS/PT & Games/ Creative Arts (CA)	0	0	2	1
TOTAL (Theory + Labs)						24

THEORY								
FOURTH	PC	AI201	Probability and Statistics	3	0	0	3	
	HSS	MT131	UHV2: Understanding Harmony	3	0	0	3	
	PC	CS239	Operating System	3	0	0	3	
		CS241	Design and Analysis of Algorithms	3	0	0	3	
		AI205	Introduction to Artificial Intelligence	3	0	0	3	
	OE		Open Elective-I	3	0	0	3	
	LABORATORIES							
	PC	IT202	IT Workshop	0	0	2	1	
		CS242	Design and Analysis of Algorithms Lab	0	0	2	1	
		CS248	Operating System Lab	0	0	3	1.5	
		AI206	Artificial Intelligence Lab	0	0	3	1.5	
	MC	MC205/ 206/207 /208	Choice of :NCC/NSS/ PT & Games/ Creative Arts (CA)	0	0	2	1	
TOTAL (Theory + Labs)							24	
FIFTH	PC/PE							
	PC	IT333	Data Comm.& Computer Networks	3	0	0	3	
		CS237	Database Management System	3	0	0	3	
		AI363	Introduction to Machine Learning	3	0	0	3	
	PE		PROGRAM ELECTIVE-I	3	0	0	3	
			PROGRAM ELECTIVE-II	3	0	0	3	
	OE		Open Elective-II	3	0	0	3	

LABORATORIES							
	PC	IT334	Data Comm.& Computer Networks Lab	0	0	3	1.5
		CS238	Database Management System Lab	0	0	3	1.5
		AI364	Machine Learning Lab	0	0	3	1.5
			PROGRAM ELECTIVE LAB-II	0	0	3	1.5
TOTAL (Theory + Labs)							24
THEORY							
SIXTH	PC/PE						
	PC	IT331	Image Processing	3	0	0	3
		AI305	Deep Learning	3	0	0	3
		AI307	Modern Artificial Intelligence	3	0	0	3
	PE		PROGRAM ELECTIVE-III	3	0	0	3
	OE		Open Elective-III	3	0	0	3
	HSS	MT204	Constitution of India	2	0	0	NC
	PROJ	MC300	Summer training				2
LABORATORIES							
		IT332	Image Processing Lab	0	0	3	1.5
		AI 306	Deep Learning Lab	0	0	3	1.5
	HSS	MT133	Communication Skills - II	0	0	3	1.5
TOTAL (Theory + Labs)							21.5
THEORY							
SEVENTH							
	PC	IT349	Cryptography & Network Security	3	0	0	3
	PE		PROGRAM ELECTIVE-IV	3	0	0	3
			PROGRAM ELECTIVE-V	3	0	0	3

	OE		Open Elective-IV	3	0	0	3
	PROJ	AI 400M	Minor Project				3
LABORATORIES							
	PE		PROGRAM ELECTIVE LAB-IV	0	0	3	1.5
TOTAL (Theory + Labs)							16.5
EIGHTH	PROJ	AI 400	Research Project / Industry Internship				10
GRAND TOTAL							169

***Requirement of Programme Elective Courses (Theory/ Lab) : 18 credit or above**

List of Program Electives (PE)

PE / LEVEL		Code no.	Name of the PECourses	Prerequisites/ Corequisites	L	T	P	C
3	PE 1	CS331	Formal Language and Automata Theory	MA205	3	0	0	3
3		AI351	Big Data Analytics	AI 201	3	0	0	3
3		IT337	Software Engineering	CS233	3	0	0	3
3		AI203	Mathematics for Data Science.	MA 205	3	0	0	3
	PE2	AI309	Evolutionary Computing	CS241	3	0	0	3
		AI310	Evolutionary Computing Lab	AI309	0	0	3	1.5
		AI311	Network Analysis	MA 205, CS241	3	0	0	3
		AI312	Network Analysis Lab	AI311	0	0	3	1.5
		IT353	Blockchain Technology	CS241	3	0	0	3
		IT354	Blockchain Technology lab	IT353	0	0	3	1.5
		AI353	Feature Engineering	AI 201	3	0	0	3
		AI354	Feature Engineering Lab	AI353	0	0	3	1.5
	PE3	AI315	Advanced Algorithms	CS241	3	0	0	3
		AI317	Information Retrieval	CS241	3	0	0	3
4		AI319	Introduction to Compiler Design	CS331	3	0	0	3
		AI321	Data Mining	CS237	3	0	0	3
4	PE4	AI471	AI in Medical Image Analysis	IT331	3	0	0	3
		AI472	AI in Medical Image Analysis Lab	AI471	0	0	3	1.5
4		IT445	Internet of Things (IoT)	IT333	3	0	0	3
		IT446	Internet of Things Lab	IT445	0	0	3	1.5
		AI425	Computer Vision	AI305 , IT331	3	0	0	3
		AI426	Computer Vision Lab	AI306, AI425	0	0	3	1.5
		IT451	Cloud Computing	IT333	3	0	0	3

4		IT452	Cloud Computing Lab	IT451	0	0	3	1.5
	PE5 (NO Lab)	AI427	Robotics	AI205, AI307	3	0	0	3
		AI475	Fundamentals of Quantum Computing	MA107, PH113	3	0	0	3
		AI429	Speech Processing	CS331	3	0	0	3
		IT351	Natural Language Processing	AI205	3	0	0	3

List of Open Electives (OE)

OE / LEVEL		Code no.	Name of the courses	Prerequisites/Cor equisites	L	T	P	C
1	OE I	CS261	Fundamentals of Data Structures	NIL	3	0	0	3
		IT261	Object Oriented Programming concepts	NIL	3	0	0	3
2	OE II	IT361	Basics of Intelligent Computing	NIL	3	0	0	3
		CS361	Database System Concepts	NIL	3	0	0	3
3	OE III	IT363	Cryptography & Network Security	NIL	3	0	0	3
		CS363	Artificial Intelligence fundamentals	NIL	3	0	0	3
4	OE IV	CS461	Fundamentals of Machine Learning	NIL	3	0	0	3
		IT461	Data mining concepts	NIL	3	0	0	3

List of Minor Papers

		Code no.	Name of the courses	Prerequisites/ Corequisites	L	T	P	C
	MINOR	IT263	Object Oriented Programming and Design pattern	NIL	3	1	0	4
		CS263	Data Structure & Algorithms	NIL	3	1	0	4
		CS265	Data Base Management System Concepts	NIL	3	1	0	4
		IT365	Data Communication & Computer Networks	NIL	3	1	0	4
		CS 450	Mini Project	NIL				4

NO SPECIALIZATION