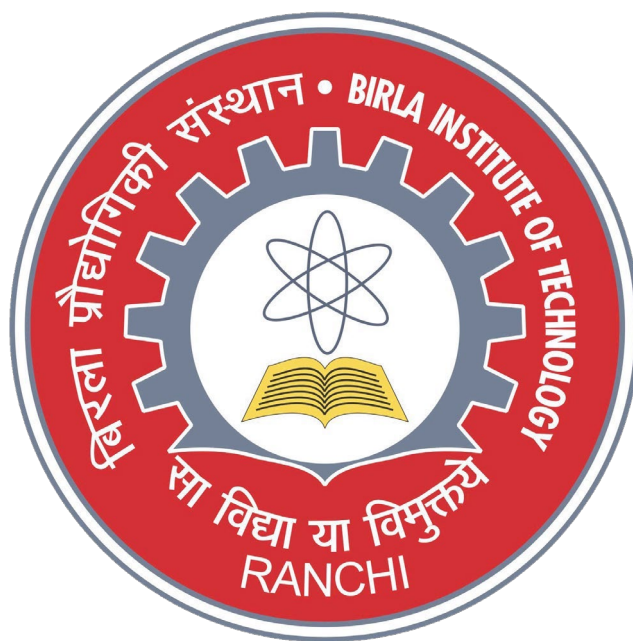# BIRLA INSTITUTE OF TECHNOLOGY

B.Sc. (Computer Science)

CURRICULUM
BASED ON NATIONAL EDUCATION POLICY 2020

(Effective from Academic Session: 2025-26)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Mr Anurag Joshi   **Ms Seema Sharma**

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)

PEO 1: The program will produce graduates who will be competent professionals in IT industry, academics, government or entrepreneurs.
PEO 2: Graduates will exhibit professional ethics, critical thinking, problem solving and effective communication skills to work collaboratively in a team-based environment.
PEO 3: The graduates will possess leadership qualities and will be capable of attaining higher positions in their professional career.
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.
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.

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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 modem 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.
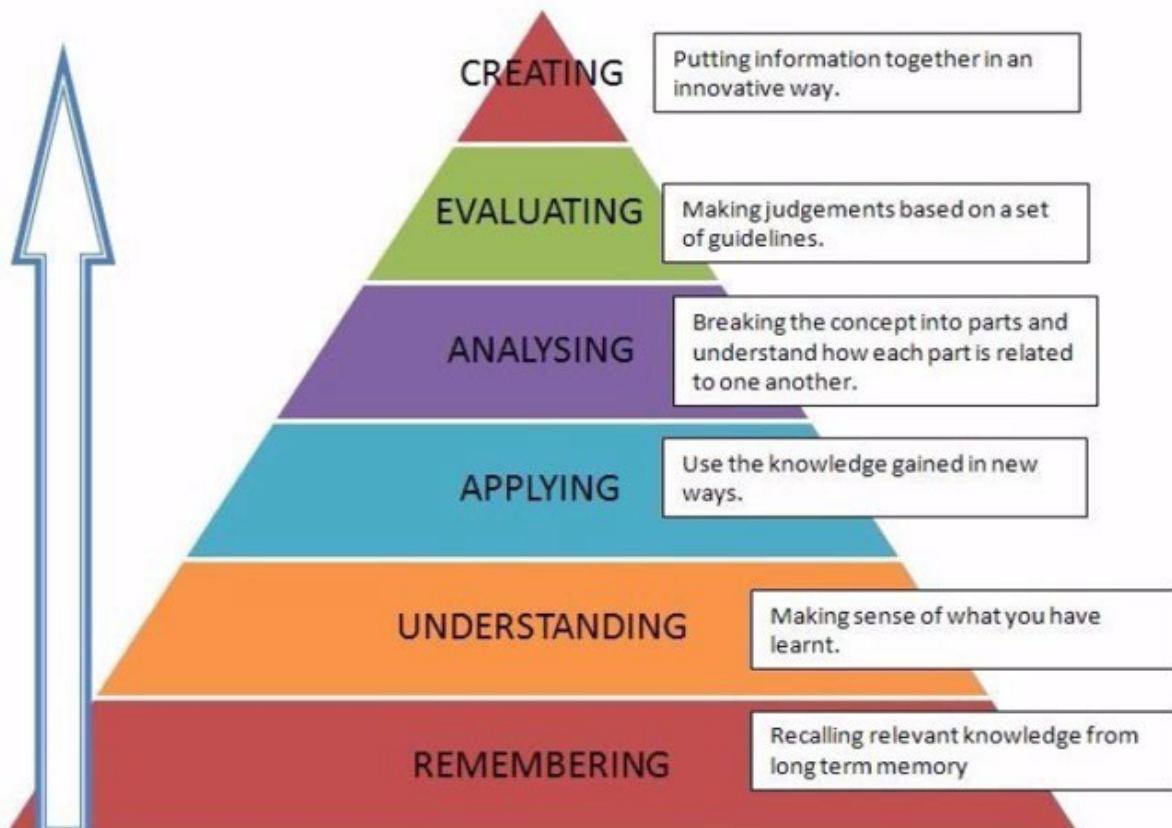
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BLOOM'S TAXONOMY FOR CURRICULUM DESIGN AND ASSESSMENT

Preamble

The design of curriculum and assessment is based on Bloom's Taxonomy. A comprehensive guideline for using Bloom's Taxonomy is given below for reference.

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Program Course Structure

		BIRLA INSTITUTE OF TECHNOLOGY-MESRA, RANCHI COURSE STRUCTURE FOR **B.Sc. (Honours / Honours with Research) Computer Science** Discipline-Specific Electives in Artificial Intelligence & Machine Learning/Data Science as per NEP-2020 (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	**ONE**	DSC	SC25103	Structured & Object Oriented Programming	3	0	0	3
		DSC	SC25105	Operating Systems	3	0	0	3
		DSC	SC25107	Fundamentals of Computing	2	0	0	2
		MDC	SC25111	Calculus	3	0	0	3
		VAC–Elective		VAC Elective I	2	0	0	2
		SEC-SB Elective		SEC-SB Elective I	2	0	2	3
		VAC-Elective		VAC Elective II	2	0	0	2
				LABORATORIES				
		DSC	SC25104	Structured & Object Oriented Programming Lab	0	0	3	1.5
		AECC	HS24131	Communication Skills-I	0	0	3	1.5
	TOTAL							**21**

DSC: 9.5
VAC: 4
AECC: 1.5
SEC: 3
MDC: 3

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Semester /Session of Study (Recom mended)	Course Level	Category of Course	Course Code	Courses	Mode of delivery & credits L-Lecture; T-Tutorial; P-Practical			Total Credits C
					L (Periods /week)	T (Periods /week)	P (Periods /week)	C
Second Spring	**ONE**			**THEORY**				
		DSC	SC25113	Introduction to Data Structures	3	1	0	4
		DSC	SC25115	Python Programming	3	0	0	3
		MDC	SC25117	Mathematics for Computing	3	0	0	3
		VAC – Elective		VAC Elective III	2	0	0	2
				LABORATORIES				
		DSC	SC25114	Data Structures Lab	0	0	3	1.5
		DSC	SC25116	Python Programming Lab	0	0	3	1.5
		AECC	HS24133	Communication Skills- II	0	0	3	1.5
		SEC-SB Elective		SEC-SB Elective II	0	1	4	3
		TOTAL						**19.5**

VOCATIONAL COURSES FOR EXIT AFTER 1st Year						
Vocational Course I	MN25120	Event Management	3	0	0	3
Vocational Course II	CA25133	Fundamentals of Multimedia	3	0	0	3

DSC: 10
VAC: 2
AECC: 1.5
SEC: 3
MDC: 3

Acronyms Expanded
- AEC   : Ability Enhancement Course
- DSC   : Discipline Specific Core (Course)
- DSE   : Discipline Specific Elective (Course)
- VAC   : Value Added Course
- SEC-SB   : Skill Enhancement Course-Skill Based
- MDC   : Multidisciplinary Course

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Ability Enhancement Course (AEC)

Course Code	Subject	L	T	P	C
HS24131	Communication Skills-1	0	0	3	1.5
HS24133	Communication Skills-2	0	0	3	1.5
MN25109	Public speaking and creative writing	2	0	0	2
MN25201	Personality Development	3	0	0	3
BF25207	Creativity and Critical Thinking Skills	2	1	0	3
BF25213	Effective Writing and Presentation Skills	1	1	0	2
	Total				**8**

Skill Enhancement Course-Skill Based (SEC-SB)

Course Code	Subject	L	T	P	C
CA25110	Office Automation Tools	0	1	4	3
CA25112	Linux administration	0	1	4	3
CA25130	Programming with MATLAB	0	1	4	3
CA25132	Introduction to Latex	0	1	4	3
CA25209	Statistics with R	2	0	2	3
MN25203	Computerized Accounting	2	0	2	3
SC25121	Quantitative Skills	2	0	2	3
	Total				**9**

Value Added Courses (VAC)

Course Code	Subject	L	T	P	C
MN25102	Human Values and Professional Ethics	2	0	0	2
HS24211	Indian Knowledge System	2	0	0	2
MN25111	Digital Empowerment	2	0	0	2
SC25169	Design Thinking	2	0	0	2
MN25112	Emotional Intelligence	2	0	0	2
CA25109	Environmental Science	2	0	0	2
	Total				**6**

Multidisciplinary Course (MDC)

Course Code	Subject	L	T	P	C
SC25111	Calculus	3	0	0	3
SC25117	Mathematics For Computing	3	0	0	3
	Total				**9**

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