

B.Sc. Data Science

(Duration: 3 Years)

CURRICULUM and SYLLABUS

(Applicable for Students admitted from Academic Year 2022-23)

DEPARTMENT OF COMPUTER APPLICATIONS HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE

HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE

Motto:

To Make Every Man a Success and No Man a Failure

Vision:

To be an International Institute of Excellence, providing a conducive environment for education with a strong emphasis on innovation, quality, research and strategic partnership blended with values and commitment to society.

Mission:

- To create an ecosystem that promotes learning and world class research.
- To nurture creativity and innovation.
- To instill highest ethical standards and values.
- To pursue activities for the development of the Society.
- To develop national and international collaborations with institutes and industries of eminence.
- To enable graduates to become future leaders and innovators.

Value Statement:

Integrity, Innovation, Internationalization.

DEPARTMENT OF COMPUTER APPLICATIONS

Vision:

The department of Computer Applications aims to transform aspiring students into software professionals with a high degree of technical skills and to inculcate a research mind set.

Mission:

- To provide strong theoretical foundations complemented with extensive practical training.
- To design and deliver curricula to meet the changing needs of industry.
- To establish strong collaborations with industry, R&D and academic institutes for training and research.
- To promote all-round development of the students through interaction with alumni and industry

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The Program Educational Objectives (PEOs) of the Computer Applications are listed below:

- **PEO1**. To prepare graduates to be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms
- PEO2. To prepare graduates to achieve peer-recognition, as an individual and as a

team player, through demonstration of good analytical, design, implementation and interpersonal skills.

- **PEO3**. To prepare graduates to contribute to society as broadly educated, expressive ethical and responsible citizens with proven expertise
- **PEO4.** To prepare graduates to pursue life-long learning to fulfil their goals.

PROGRAMME OUTCOMES (PO'S):

(To be achieved by the student after every semester/year/and at the time of graduation) At the end of this program, graduates will be able to

1. **Computer knowledge:** Apply the knowledge of mathematics, computer Fundamentals to IT applications.

2. **Design/Development of solutions:** Design solutions for IT applications using latest technologies and develop and implement the solutions using various latest languages.

3. **Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex IT applications with an understanding of the limitations.

4. **Environment and sustainability:** Understand the impact of the IT analyst solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

5. *Ethics:* Apply ethical principles and commit to professional ethics and responsibilities

and norms of the engineering practice.

6. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PROGRAMME SPECIFIC OUTCOMES (PSO'S):

PSO-1: Apply mathematical, conceptual knowledge of computing and analytical skills to demonstrate data analytics of real-world applications.

PSO-2: Hands-on experience with appropriate data analytics tools to enhance their knowledge in the field of data science.

PSO-3: Equipped with creative and technical skills in various domains of Data Handling, Predictive Modelling and Data Visualization.

B.SC. DATA SCIENCE

	SEMESTER- I										
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Р	С	S	тсн		
1	CF	ELA0101	English	2	0	0	2	1	2		
2	CF	MAA0106	Mathematical Foundations for Data Science	3	1	0	4	0	4		
3	РС	CAB0106	Programming in C	3	1	0	4	0	5		
4	PC	CAB0107	Data Science Fundamentals	3	0	0	3	1	3		
5	PC	CAB0108	Computer Organization	3	0	0	3	0	3		
PRAG	CTICAL										
6	PC	CAB0134	C Programming Lab	0	0	2	1	0	2		
7	PC	CAB0135	Data Analysis with Excel Lab	0	0	2	1	0	2		
			Total	14	2	4	18	2	21		
	L – Lecture; T – Tutorial; P – Practical; C – Credit; S- Self Study; TCH- Total Contact Hours										

SEMESTER- II										
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	Т	Ρ	С	S	тсн	
1	CF	MAA0108	Statistics for Data Science	3	1	0	4	0	4	
2	РС	CAB0124	Data Structures and Algorithm	3	0	2	4	0	5	
3	PC	CAB0125	Operating Systems	3	0	0	3	1	3	
4	РС	CAB0126	Data Base Management System	3	0	0	3	0	3	
5	РС	CAB0127	Python for Data Science	3	0	0	3	1	3	
			PRACTICAL							
6	PC	CAB0145	Database Management System Lab	0	0	2	1	0	2	
7	PC	CAB0146	Python Programming Lab	0	0	2	1	0	2	
			Total	15	1	6	19	2	22	
	L – Lecture; T – Tutorial; P – Practical; C – Credit; S- Self Study; TCH- Total Contact Hours									

SEMESTER- III										
SL. NO	COURSE CATEGOR Y	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	с	S	тсн	
1	РС	CAB0212	Computer Networks	3	0	0	3	0	3	
2	PC	CAB0213	Artificial Intelligence	3	1	0	4	0	3	
3	PC	CAB0214	Data Analytics using R	3	1	0	4	1	4	
4	DE	CAB0215	Business Analytics	3	0	0	3	1	3	
5	PC	CAC02**	Elective – 1	2	1	2	4	0	5	
			PRACTICAL							
6	РС	CAB0235	Data Science programming using R	0	0	2	1	0	2	
7	PC	CAB0236	Business Analytics Lab	0	0	2	1	0	2	
			Total	14	3	6	20	2	22	
L-	L – Lecture; T – Tutorial; P – Practical; C – Credit; S- Self Study; TCH- Total Contact Hours									

SEMESTER- IV										
SL. NO	COURSE CATEGOR Y	COURSE CODE	NAME OF THE COURSE	L	т	Р	с	S	тсн	
1	PC	CAB0226	Machine Learning	3	0	0	3	1	3	
2	PC	CAB0227	Data Security and Privacy	3	0	2	4	0	5	
3	SEC	CAB0228	Professional Ethics and Life Skills	3	0	0	3	1	5	
4	РС	CAB0229	Data Handling and Visualization	3	0	0	3	1	3	
5	DE	CAC02**	Elective – II	2	1	2	4	0	5	
			PRACTICAL							
6	PC	CAB0245	Machine Learning Lab	0	0	2	1	0	2	
7	РС	CAB0246	Data Handling and Visualization Lab	0	0	2	1	0	2	
			Total	14	1	8	19	3	25	
L-	L – Lecture; T – Tutorial; P – Practical; C – Credit; S- Self Study; TCH- Total Contact Hours									

SEMESTER- V										
SL. NO	COURSE CATEGOR Y	COURSE CODE	NAME OF THE COURSE	L	т	Ρ	С	S	тсн	
1	PC	CAB0306	Big Data and Analytics	3	0	0	3	1	4	
2	РС	CAB0307	Principles of Deep Learning	3	0	2	4	0	5	
3	DE	CAC03**	Elective – III	2	1	2	4	0	5	
4	DE	CAC03**	Elective – IV	2	1	2	4	0	5	
			PRACTICAL							
5	PC	CAB0334	Big Data and Analytics Lab	0	0	2	1	0	2	
6	PC	CAB0331	Mini Project	0	0	2	1	0	2	
			Total	10	2	10	17	1	23	
L – I	L – Lecture; T – Tutorial; P – Practical; C – Credit; S- Self Study; TCH- Total Contact Hours									

	SEMESTER- VI										
SL. NO	COURSE CATEGOR Y	COURSE CODE	NAME OF THE COURSE	L	т	Р	с	S	тсн		
1	РС	CAB0318	Techniques And Tools for Data Science	3	0	2	4	1	5		
2	PE	CAC03**	Elective – V	2	1	2	4	0	5		
	PRACTICAL										
3	PC	CAB0341	Internship	*	*	*	1	*	0		
4	PC	CAB0342	Project Work	0	0	16	8	0	16		
			Total	5	1	20	17	1	26		
L-	L – Lecture; T – Tutorial; P – Practical; C – Credit; S- Self Study; TCH- Total Contact Hours										

*3 weeks Internship.

*Internship to be done during the Winter Vacation after the 5th Semester.

TOTAL CREDITS: 110

LIST OF DEPARTMENTAL ELECTIVES WITH GROUPING - SEMESTER WISE										
SEM	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	т	Р	с	S	тсн	
Electi	ve l									
3	DE	CAC0253	Time Series Analysis	2	1	2	4	0	5	
3	DE	CAC0254	Data Wrangling Techniques	2	1	2	4	0	5	
Electi	ve ll									
4	DE	CAC0272	Predictive Modelling and Analytics	2	1	2	4	0	5	
4	DE	CAC0273	Statistical Inference for Data Science	2	1	2	4	0	5	
Electi	ve III									
5	DE	CAC0359	Social Network Analytics	2	1	2	4	0	5	
5	DE	CAC0360	Information Retrieval and Processing	2	1	2	4	0	5	
Electi	ve IV									
5	DE	CAC0361	Computer Vision Techniques	2	1	2	4	0	5	
5	DE	CAC0362	Digital Image processing using MATLAB	2	1	2	4	0	5	
Electi	ve V									
6	DE	CAC0375	Conditional Monitoring Techniques for Data Science	2	1	2	4	0	5	
6	DE	CAC0376	IoT Cloud and Data Analytics	2	1	2	4	0	5	