M.Sc. Data Science Course Curriculum

(w.e.f. Academic Year 2023-24)

M.SC. (Data Science) FIRST YEAR

I-SEMESTER

Paper Code	Title of the paper	Credits	# Hours	Max. Marks
MDS-101	Mathematical Foundations for Data Science	4	4	100
MDS-102	Design and Analysis of Algorithms	4	4	100
MDS-103	Software Engineering	4	4	100
MDS-104	A: Principles of Data Science B: Java Programming	4	4	100
MDS-105	Design and Analysis of Algorithms Lab	2	4	50
MDS-106	A: Principle of Data Science Lab B: Java Programming Lab	2	4	50
	Total	**20**	**24**	**500**

II-SEMESTER

Paper Code	Title of the paper	Credits	# Hours	Max. Marks
MDS-201	Statistical Inference	4	4	100
MDS-202	Data Visualization Techniques	4	4	100
MDS-203	Cloud Computing	4	4	100
MDS-204	Artificial Intelligence	4	4	100
MDS-205	Advanced Machine Learning Techniques	4	4	100
MDS-206	Statistical Inference & Data Visualisation Lab	2	4	50
MDS-207	Advanced Machine Learning Lab	2	4	50
	Total	**24**	28	**500**

M.SC. (Data Science) SECOND YEAR

III-SEMESTER

Paper Code	Title of the paper	Credits	# Hours	Max. Marks
MDS-301	Deep Learning Techniques	4	4	100
MDS-302	Machine Learning Operations	4	4	100
MDS-303 (E-I)	a) Data Mining	4	4	100
	b) Text Data Analytics			
	c) Enterprise Architecture			
	d) Business Intelligence			
MDS-304 (E-II)	a) Data Stream Mining	4	4	100
	b) Sentimental Analysis			
	c) Scalable Architecture			
	d) Computer Vision			
MDS-305	Deep Learning Techniques Lab	2		
MDS-306	Capstone Project-I	2	4	50
MDS-307	Seminar	2	4	50
	No of Credits	**22**	**24**	**500**

Elective Streams E-I & E-II:

A: Data Mining and Data stream mining
B: Text Data Analytics and Sentimental Analysis
C: Architecting Applications and Scalable Architecture
D: Business Intelligence and Computer Vision

IV-SEMESTER

Paper Code	**Title of the paper**	**Credits**	**# Hours**	**Max. Marks**
MDS-401	Research Methodology	2	2	100
MDS-402	Capstone Project-II	12	24	100
	No of Credits	**24**	26	**500**

M.SC. (DATA SCIENCE) I-SEMESTER

MDS-101: PAPER- I: MATHEMATICAL FOUNDATIONS FOR DATA SCIENCE

SYLLABUS

UNIT – I

Vector Spaces: Vector spaces, Subspaces, Basis and dimension of a vector space, linear dependence and independence, spanning set. Linear transformation, kernel, range, Matrix Representation of a linear transformation, rank- nullity theorem, change of basis and similar matrices Inner-product spaces, orthogonal sets and bases, Orthogonal Projection, Gram-Schmidt orthogonalization process

UNIT-II

Matrices: Trace and Rank of a Matrix and their properties, Determinants, Inverse, symmetric, orthogonal and idempotent matrices and their properties, Gauss elimination, row canonical form, diagonal form, triangular form,

UNIT – III

Eigenvalue Problems: Characteristic roots and vectors, Caley-Hamilton theorem, Diagonalization of a Matrix, algebraic and geometric multiplicity of a characteristic root and spectral decomposition of a real symmetric matrix., Singular value Decomposition. Gauss-Jordan-LU decomposition, Singular Value Decomposition,

UNIT – IV

Quadratic forms: Real quadratic forms (QFs), reduction and classification of QFs, index and signature. Simultaneous reduction of two QFs. Extreme form of a QF. Moore-Penrose and generalized inverses and their properties.

REFERENCE BOOKS

1. Gilbert Strang (2016): Introduction to linear algebra, 5/e., Wellesley-Cambridge.
2. David C. Lay (2019): Linear Algebra and Its Applications, Pearson, 5/e.
3. Graybill, F.A. (1983) : Matrices with applications in statistics, 2nd ed, Wadsworth.
4. Rao,C.R., Mithra, S.K. (1971): Generalised inverse of matrices and its applications, John Wiley & Sons Inc.
5. Rao, C.R. and Bhimasankaram, P. (1992): Linear algebra, TMH.