

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

Empowered Autonomous Institution



Structure and Curriculum of Three - Year Degree Programme with Multiple Entry and Exit option

Undergraduate Programme of Science & Technology

B.Sc. in Data Science

Under Apprenticeship Embedded Degree Programme

(AEDP)

Board of Studies

in

Computer Science

Rajarshi Shahu Mahavidyalaya, Latur

Empowered Autonomous Institution

Rajarshi Shahu Mahavidyalaya,
Latur (Autonomous)

w.e.f. June, 2026

(In accordance with NEP-2020)

Review Statement

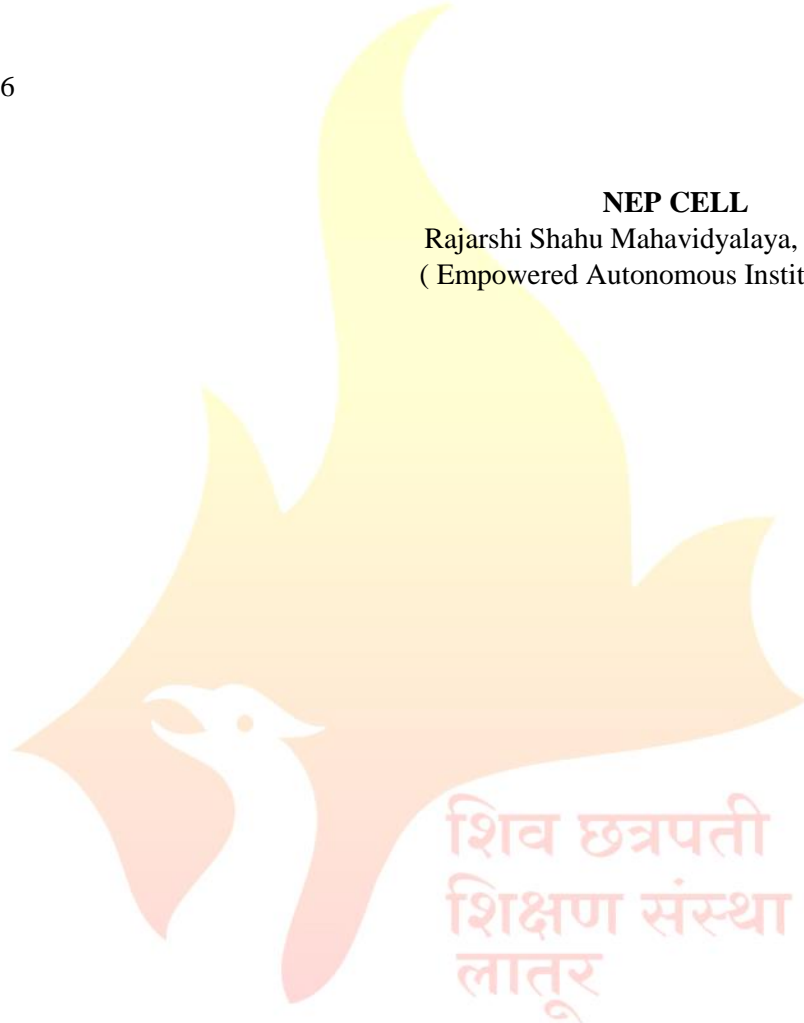
The NEP Cell reviewed the Curriculum of **B. Sc. in Data Science** Programme to be effective from the **Academic Year 2026-27**. It was found that, the structure is as per the NEP-2020 guidelines of Govt. of Maharashtra.

Date: 05/05/2026

Place: Latur

NEP CELL

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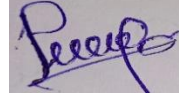
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CERTIFICATE

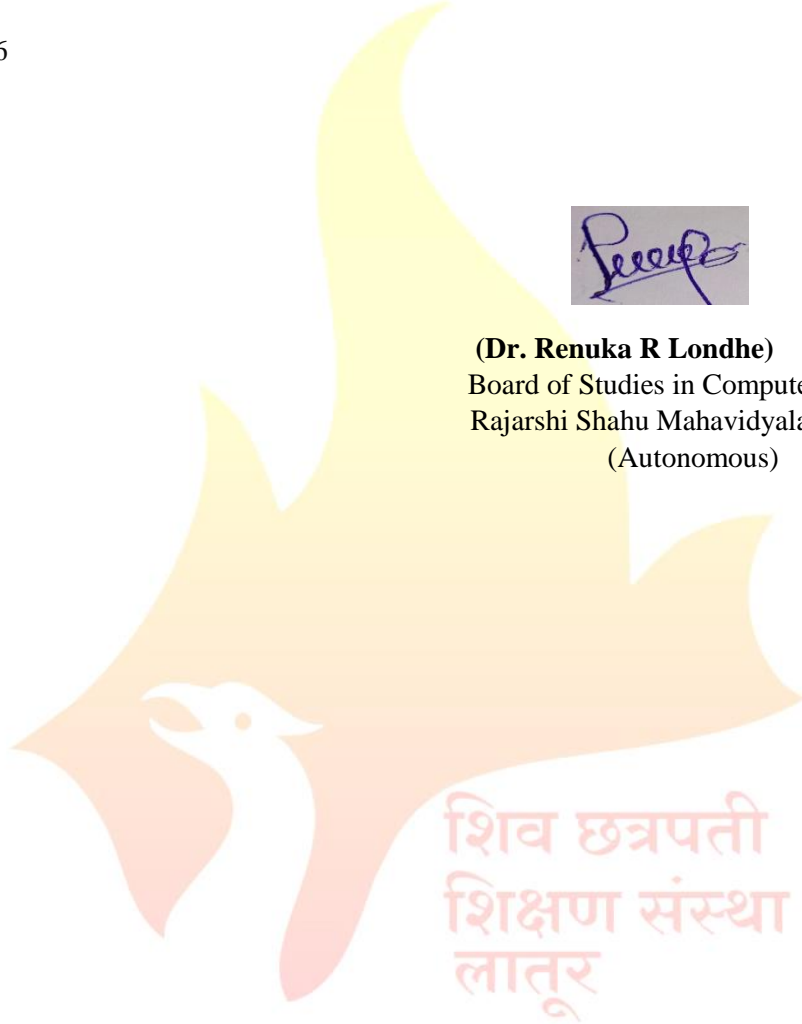
I hereby certify that the documents attached are the Bonafide copies of the curriculum of **B. Sc. in Data Science** Programme under AEDP to be effective from the **Academic Year 2026-27**.

Date: 05/05/2026

Place: Latur



(Dr. Renuka R Londhe)
Board of Studies in Computer Science
Rajarshi Shahu Mahavidyalaya, Latur
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**Shiv Chhatrapati Shikshan Sanstha's
Rajarshi Shahu Mahavidyalaya, Latur**

Empowered Autonomous Institution

Members of Board of Studies in the Subject Computer Science

Under the Faculty of Science and Technology

Department of Computer Science

Sr. No.	Name	Designation	In position
1	Dr. Renuka Londhe, Assistant Professor, Rajarshi Shahu Mahavidyalaya, Latur Empowered Autonomous Institution	Chairman	HoD
2	Dr. M. H. Kondekar, Dean, Marathwada Institute of Technology. CIDCO Aurangabad Email: mahendra.kondekar@mit.asia Mob. 9822118755	Member	Academic Council Nominee
3	Dr. Shriram Dagadu Raut, Dept. of Computer Science, School of Computational Sciences Punyashlok Ahilyadevi Holkar Solapur University, Solapur-Pune Highway, Kegaon, Solapur	Member	Academic Council Nominee
4	Dr. Shrikant G. Jadhav, HoD, Department of Computer Science, Yeshwant Mahavidyalaya, Nanded Email: jadhavsg.ymn@gmail.com Mob. 9423140192	Member	University Nominee
5	Mr. Avinash Jadhav, Director, Mind Craft software solutions, Pune Email: avijadhav@gmail.com Mob. 9028818356	Member	Industry areas
6	Dr. Santosh Shrikhande, Assistant Professor, School of Technology, SRTMU, Sub Center, Peth, Latur Email: santoshshrikhande@gmail.com Mob.9765223939	Member	College Alumni
7	Prof. Dr. Poorna Shankar, Professor and Dean, Indira College of Engineering and Management Pune, Email: poornashankar@indiraiem.ac.in Mob. 8237816742	Member	Expert for special courses

Sr. No.	Name	Designation	In position
8	Ms. Suchitra Sonwane, Assistant Professor, Rajarshi Shahu Mahavidyalaya, Latur Empowered Autonomous Institution	Member	Faculty Member
9	Mr. Arun Shinde, Assistant Professor, Rajarshi Shahu Mahavidyalaya, Lanar Empowered Autonomous Institution	Member	Faculty Member
10	Ms. Sunita Jadhav, Assistant Professor, Rajarshi Shahu Mahavidyalaya, Latur Empowered Autonomous Institution	Member	Faculty Member
11	Ms. Humera Maniyar, Assistant Professor, Rajarshi Shahu Mahavidyalaya, Latur Empowered Autonomous Institution	Member	Faculty Member
12	Ms. Pooja Latoria, Assistant Professor, Rajarshi Shahu Mahavidyalaya, Latur Empowered Autonomous Institution	Member	Faculty Member
13	Mr. Mahesh Katambe, Assistant Professor, Rajarshi Shahu Mahavidyalaya, Latur Empowered Autonomous Institution	Member	Faculty Member
14	Ms. Swati Sandur. Assistant Professor, Rajarshi Shaha Mahavidyalaya, Latur Empowered Autonomous Institution	Member	Faculty Member



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Rajarshi Shahu Mahavidyalaya,
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From the Desk of the Chairperson...

It is an era of unprecedented digital transformation. The rapid advancements in Data Science, Artificial Intelligence, Machine Learning, and the Internet of Things (IoT) have revolutionized not just industries and governance, but the very fabric of our everyday lives. In this data-driven landscape, the ability to extract meaningful insights, build intelligent systems, and solve complex real-world problems using advanced computational methods has become an indispensable skill set.

Recognizing this global shift, the Board of Studies (BoS) in Computer Science at Rajarshi Shahu Mahavidyalaya, Latur (Autonomous), is proud to introduce the Three-year B.Sc. Data Science (Under AEDP) Programme, fully aligned with the National Education Policy (NEP) 2020.

Data Science sits at the dynamic intersection of computer science, statistics, and domain expertise. It empowers professionals to transform raw, unstructured data into actionable intelligence. Our curriculum is meticulously crafted to ensure that our graduates do not just learn, but lead.

This program develops a robust mastery of mathematical, statistical, and computational principles.

With gain rigorous hands-on experience with industry-standard languages and libraries, including Python, R, SQL, NumPy, Pandas, Scikit-learn, and TensorFlow.

Program also cultivate problem-solving skills tailored for high-impact sectors like healthcare, finance, e-commerce, and scientific research.

By aligning with NEP-2020's vision of multidisciplinary learning and flexibility, we are committed to producing graduates who are not only employable but are visionary innovators in the global data ecosystem.

We invite you to join us in this exciting journey toward mastering the language of the future.

Chairman,
Board of Studies (Computer Science)
Rajarshi Shahu Mahavidyalaya, Latur (Empowered Autonomous Institution)



(Dr. Renuka R Londhe)

Board of Studies in Computer Science

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**Shiv Chhatrapati Shikshan Sanstha's
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**Empowered Autonomous Institution
Faculty of Science and Technology**

**Structure for Four Year Multidisciplinary Undergraduate Degree Programme in Computer
Science Multiple Entry and Exit (In accordance with NEP-2020)**

Year & Level	Sem	Major		Minor	GE/OE	VSC/ SEC (VSEC)	AEC/ VEC	OJT,FP,CEP, RP	Credit per Sem.	Cum./Cr. per exit
		DSC	DSE							
1	2	3		4	5	6	7	8	9	10
I 4.5	I	DSC I: 04 Cr. DSC II: 04 Cr.	NA	NA	GE-I: 04 Cr.	VSC-I: 02 Cr. SEC-I: 02 Cr.	AEC-I MIL: 02 Cr. VEC-I: 02 Cr.	CC-I: 02 Cr. (NSS, NCC, Sports, Cultural)/ CEP-I: 02 Cr. (SES-I)/ OJT: 02 Cr. / Mini Project: 02 Cr.	22	44 Cr. UG Certificate
	II	DSCIII: 04 Cr. DSC IV: 04 Cr.	NA	NA	GE-II: 04 Cr.	VSC-II: 02 Cr. SEC-II: 02 Cr.	AEC- II MIL: 02 Cr. VEC- II: 02 Cr.	Generic IKS: 02 Cr.	22	
	Cum. Cr.	16	-	-	08	04+04= 08	04+02 +02=0 8	04	44	
Exit Option: Award of UG Certificate in Major with 44 Credits and Additional 04 Credits Core NSQF Course/Internship or continue with Major and Minor										

Abbreviations:

1. DSC : Discipline Specific Core (Major)
2. DSE : Discipline Specific Elective (Major)
3. DSM : Discipline Specific Minor
4. GE/OE : Generic/Open Elective
5. VSEC : Vocational Skill and Skill Enhancement Course
6. VSC : Vocational Skill Courses
7. SEC : Skill Enhancement Course
8. AEC : Ability Enhancement Course
9. MIL : Modern Indian Languages
10. IKS : Indian Knowledge System
11. FSRCE : Fostering Social Responsibility & Community Engagement
12. VEC : Value Education Courses
13. OJT : On Job Training
14. FP : Field Projects
15. CEP : Community Engagement and Service
16. CC : Co-Curricular Courses
17. RP : Research Project/Dissertation
18. SES : Shahu Extension Services

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 Department of Computer Science
 B.Sc. Data Science

Year & Level	Semester	Course Code	Course Title	Credits	No. of Hrs.	
I 4.5	I	(DSC-I)	Problem Solving using 'C' Language	03	45	
			Lab Course-I	01	30	
		(DSC-II)	Matrices and Calculus	03	45	
			Lab Course-II	01	30	
		GE-I	Statistics for Data Science –I	04	60	
		(VSC-I) Practical	Data Analysis using Spreadsheet	02	60	
		(SEC-I) Practical	From Basket (Introduction to Databases-I)	02	60	
		(AEC-I)	From Basket	02	30	
		(VEC-I)	Constitution of India	02	30	
		AIPC/OJT-I	Min Project	02	60	
	Total Credits				22	
	II	(DSC-III)	Python & Data Structure	03	45	
			Lab Course-III	01	30	
		(DSC - IV)	Linear Algebra	03	45	
			Lab Course-IV	01	30	
		GE-II	From Basket Digital Marketing	04	60	
		(VSC-II) Practical	Python for Data Science	02	60	
		(SEC-II) Practical	Web Programming using HTML & CSS	02	60	
		(AEC-II)	From Basket	02	30	
		(CC-I)	FSRCE (CBPR)	02	30	
Generic IKS		Introduction to Indian Knowledge System	02	60		
Total Credits				22		
Total Credits (Semester I & II)				44		



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Programme Outcomes (POs) for B.Sc. Programme	
PO 1	Apply mathematical, statistical, and computational principles to solve data-driven problems.
PO 2	Analyze structured and unstructured data using appropriate tools, techniques, and methodologies.
PO 3	Design and develop efficient software, algorithms, and database solutions for real-world applications.
PO 4	Evaluate machine learning models and data analytics techniques for predictive decision-making.
PO 5	Create meaningful visualizations and effectively communicate analytical insights.
PO 6	Demonstrate ethical, professional, and social responsibility in data handling and AI applications.
PO 7	Conduct independent research, innovate solutions, and engage in lifelong learning.



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Programme Specific Outcomes (PSOs) for B.Sc. (Data Science)	
PSO No.	Upon completion of this programme the students will be able to
PSO 1	Apply statistical, mathematical, and computational techniques to extract insights from complex datasets.
PSO 2	Develop software solutions using Python, R, SQL, and modern data science frameworks.
PSO 3	Design, implement, and evaluate machine learning and artificial intelligence models.
PSO 4	Manage relational and non-relational databases for efficient data storage and retrieval.
PSO 5	Create interactive visualizations and communicate analytical findings effectively.
PSO 6	Apply ethical principles, privacy standards, and responsible AI practices in professional environments.
PSO 7	Conduct research and develop innovative solutions for domain-specific challenges.
PSO 8	Integrate data science methodologies across multidisciplinary domains such as healthcare, finance, agriculture, and business.



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Semester - I

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Empowered Autonomous Institution
Department of Computer Science

UG I & Semester I

Course Type : DSC I

Course Title : Problem Solving using 'C' Language

Course Code : 101DSC1101

Credits : 03

Marks: 75

Hours: 45

Learning Objectives:

- LO 1. Apply structured problem-solving techniques using algorithms and flowcharts.
- LO 2. Cultivate foundational programming skills in the C language.
- LO 3. Implement control structures and modular programming concepts to design efficient solutions.
- LO 4. Manipulate data using arrays, strings, and pointers in a memory-efficient manner.
- LO 5. Handle structured data and perform file input/output operations for real-world applications.
- LO 6. Apply C programming skills to solve data-centric problems across various domains

Course Outcomes:

After completion of the course, students will be able to-

- CO 1. Demonstrate understanding of basic programming principles and C syntax.
- CO 2. Design algorithms and flowcharts for data-driven problems.
- CO 3. Write C programs using control structures and user-defined functions.
- CO 4. Apply arrays, strings, and pointers for effective data manipulation and memory management.
- CO 5. Construct structured programs using data files and structures for persistent data handling.
- CO 6. Optimize C programs to solve real-world domain-specific problems.

Unit No.	Title of Unit & Contents	Hrs.
I	Fundamentals of Programming & C Language	12
	Introduction to computers and programming Problem-solving strategies and flowcharts Basics of C language: structure, syntax, variables, data types Operators and expressions Input/Output functions	
	Unit Outcomes: UO 1. Understand the basics of computer programming and the role of C in computational thinking UO 2. Apply logical flow to problems using algorithms and flowcharts.	
II	Control Structures and Functions	10
	Conditional statements: if, else, switch Looping constructs: for, while, do-while Break and continue statements Introduction to functions Function declaration, definition, and recursion	
	Unit Outcomes: UO 1. Write modular programs using user-defined functions	

Unit No.	Title of Unit & Contents	Hrs.
	UO 2. Apply recursion to solve repetitive problems	
III	Arrays, Strings, and Pointers	13
	One-dimensional and multidimensional arrays String handling and character arrays Concepts and operations using pointers Pointer and array relationship Dynamic memory allocation (malloc, calloc, free)	
	Unit Outcomes: UO 1. Manipulate large datasets using arrays UO 2. Handle textual data using string functions	
IV	Structures, File Handling, and Applications	10
	Structures and unions File operations: reading, writing, updating files Binary vs text files Real-world problem-solving using C: case studies Debugging and code optimization techniques	
	Unit Outcomes: UO 1. Perform file operations for persistent data storage UO 2. Solve domain-specific problems with optimized C solutions	

Learning Resources:

1. The C Programming Language by Brian W. Kernighan & Dennis M. Ritchie
2. Programming in ANSI C by E. Balagurusamy
3. Computer Basics and C Programming by V. Rajaraman
4. Programming in C by Reema Thareja
5. Let Us C by Yashavant Kanetkar
6. C Programming: A Modern Approach by K. N. King

Internal Examination Pattern:

CAT – I: Home Assignment

CAT – II: PPT Presentation/ Open Book Test/ Poster Presentation/ Seminar/ Online Quiz /
Descriptive Test/Blind Code Competition

Mapping of POs, PSOs and COs:

CO \ PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	PS O8
CO1	3	2	1	0	0	0	0	3	2	0	3	0	0	0	0
CO2	2	3	2	1	0	0	0	2	3	0	2	2	0	0	0
CO3	1	2	3	2	1	0	0	2	3	0	3	0	0	0	2
CO4	-	1	2	3	2	1	0	2	3	0	3	3	2	0	2
CO5	2	2	3	2	2	1	0	3	3	0	3	3	2	0	2
CO6	3	3	3	3	2	2	2	3	3	2	3	2	2	3	3

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**Empowered Autonomous Institution
Department of Computer Science**

UG I & Semester I

Course Type : Lab Course

Course Title : Lab Course –I (Based on DSC-I)

Course Code : 101DSC1103

Credits : 01

Max. Marks: 50

Hours: 30

Learning Objectives:

- LO 1. Apply structured problem-solving techniques using algorithms and flowcharts
- LO 2. Develop foundational programming skills in C language
- LO 3. Implement control structures and modular programming concepts for efficient solutions
- LO 4. Manipulate data using arrays, strings, and pointers in a memory-efficient manner
- LO 5. Handle structured data and file input/output operations in real-world applications
- LO 6. Apply C programming skills to solve data-centric problems in various domains

Course Outcomes:

After completion of the course, students will be able to-

- CO 1. Demonstrate understanding of basic programming principles and C syntax
- CO 2. Design algorithms and flowcharts for data-driven problems
- CO 3. Develop C programs using control structures and user-defined functions
- CO 4. Apply arrays, strings, and pointers for effective data manipulation and memory management
- CO 5. Construct structured programs using data files and structures for persistent data handling
- CO 6. Analyze and optimize C programs to solve real-world domain-specific problems

Practical No.	Unit
1	Any three programs on printf & scanf statements & Program to calculate simple interest
2	Any three programs on datatypes in C Language & Program to convert temperature from Celsius to Fahrenheit
3	Any three programs on operators in C language.
4	Any three programs on for & while loop.
5	Any three programs using if, if-else, if else ladder
6	Program to find factorial of a number using recursion.
7	Program to calculate Fibonacci series using recursion.
8	Program to create a calculator using switch statement
9	Any two programs to demonstrate Array & Program to find largest and smallest element in an array
10	Program to reverse a string without using library functions
11	Program to demonstrate use of pointers for swapping two numbers
12	Program to store and display student information using structures
13	Program to read and write data to a file (text mode) and count number of lines



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Department of Computer Science
UG I & Semester I

Course Type : DSC-II
Course Title : Matrices and Calculus
Course Code : 101DSC1102
Credits : 03 Max. Marks: 75 Hours: 45

Learning Objectives

- LO 1. Apply matrix operations and calculus techniques to solve real-world data science problems.
- LO 2. Use matrix algebra in data modeling, linear transformations, and machine learning.
- LO 3. Apply differentiation and integration to analyze trends and optimize models.
- LO 4. Use multivariable calculus for understanding multidimensional data behaviors.

Course Outcomes:

After completion of the course, students will be able to-

- CO 1. Perform matrix operations and understand their application in data analytics.
- CO 2. Apply linear algebra methods in data transformation and reduction techniques.
- CO 3. Solve optimization problems using concepts of differential calculus.
- CO 4. Use integral and multivariable calculus for data modeling and interpretation.

I	Matrix Fundamentals for Data Modeling	10
	Types of matrices and operations Determinants and inverse of a matrix Rank of a matrix and echelon forms System of linear equations: Gauss elimination, Gauss-Jordan Applications in data systems (e.g., image representation, recommendation systems)	
	Unit Outcome: UO 1. Perform core matrix operations. UO 2. Solve systems of equations relevant to data applications.	
II	Linear Algebra in Data Science	12
	Vector spaces, linear independence, basis, and dimension Linear transformations and their matrix representations Eigenvalues and eigenvectors Diagonalization, spectral decomposition Principal Component Analysis (PCA) introduction	
	Unit Outcome: UO 1. Implement linear transformations. UO 2. Apply eigen-decomposition for dimensionality reduction and Principal Component Analysis (PCA).	
III	Differential Calculus for Optimization	13
	Limits, continuity, and differentiability Rules of differentiation and higher-order derivatives Maxima and minima of functions Gradient and directional derivatives Cost functions and optimization in machine learning	

	Unit Outcomes: UO 1. Apply derivative concepts to find patterns UO 2. Perform optimizations in data modeling.	
IV	Integral and Multivariable Calculus in Data Analysis	10
	Indefinite and definite integrals, applications in data aggregation Improper integrals and probability density functions Multivariable functions: partial derivatives, chain rule Double and triple integrals for spatial data Optimization with constraints (Lagrange multipliers)	
	Unit Outcome: UO 1. Use integral and multivariable calculus in modeling continuous data UO 2. Apply advanced analytical techniques to complex datasets.	

Learning Resources:

1. Matrix Computations, Gene H. Golub & Charles F. Van Loan, Johns Hopkins University Press
2. Introduction to Linear Algebra, Gilbert Strang, Wellesley-Cambridge Press
3. Essential Math for Data Science, Thomas Nield, O'Reilly Media
4. Practical Linear Algebra for Data Science-Mike X Cohen
5. Calculus for Machine Learning- Jason Brownlee
6. <https://numpy.org/doc/stable/reference/routines.linalg.html>

Internal Examination Pattern

CAT – I: Home Assignment

CAT – II: PPT Presentation/ Open Book Test/ Poster Presentation/ Seminar/ Online Quiz /

Descriptive Test

Mapping of POs, PSOs and COs:

CO \ PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	PS O8
CO1	3	2	2	0	0	0	0	3	2	0	2	0	0	0	2
CO2	3	3	2	2	0	0	0	3	3	2	2	0	0	0	3
CO3	3	2	2	3	0	0	0	3	2	2	0	0	0	0	2
CO4	3	2	2	3	2	0	0	3	2	2	0	2	0	0	2

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Department of Computer Science
UG I & Semester I

Course Type : Lab Course

Course Title : Lab Course –II (Based DSC-II)

Course Code :101DSC1104

Credits : 01

Max. Marks: 50

Hours: 30

Learning Objectives

- LO1. Apply matrix operations and calculus techniques to solve real-world data science problems.
- LO2. Implements matrix algebra to construct data models, perform linear transformations and analyze machine learning algorithms.
- LO3. Apply differentiation and integration to analyze trends and optimize models.
- LO4. Use multivariable calculus for understanding multidimensional data behaviors.

Course Outcomes:

After completion of the course, students will be able to-

- CO1. Perform matrix operations and understand their application in data analytics.
- CO2. Apply linear algebra methods in data transformation and reduction techniques.
- CO3. Solve optimization problems using concepts of differential calculus.
- CO4. Use integral and multivariable calculus for data modeling and interpretation.

Practical No.	Unit
1	Perform basic matrix operations (addition, multiplication, inversion), and visualize matrix behavior with heatmaps. (Tools: Python (NumPy, Matplotlib))
2	Implement Gauss Elimination and Gauss-Jordan methods to solve linear equations.(Tools: Python (NumPy/SymPy), MATLAB, Octave)
3	Develop a program to compute rank and row echelon form of a matrix and interpret solutions of linear systems. (Tools: Python (SymPy), MATLAB)
4	Compute and visualize eigenvectors and eigenvalues, interpret data transformation effects. (Tools: Python (Pandas, Scikit-learn, Matplotlib))
5	Perform Principal Component Analysis on a real dataset (e.g., Iris) and visualize variance captured. (Tools: Python (Pandas, Scikit-learn, Matplotlib))
6	Verify properties of vector spaces, orthogonal sets, and projection onto subspaces. (Tools: Python (NumPy, SymPy), MATLAB)
7	Create visualizations of functions and their derivatives to understand slopes and curvature. (Tools: Python (Matplotlib, SymPy), Desmos)
8	Use gradient-based optimization to find minima/maxima of cost functions in 1D and 2D. (Tools: Python (SciPy, Matplotlib), Jupyter Notebook)
9	Solve constrained optimization problems using Lagrange Multipliers method.(Tools: Python (SymPy), MATLAB)
10	Compute definite integrals numerically (trapezoidal, Simpson's rule) and visualize area under curves. (Tools: Python (NumPy, SciPy, Matplotlib))
11	Compute partial derivatives and visualize 3D surfaces and contour maps. (Tools: Python (Matplotlib 3D, Plotly), MATLAB)
12	Use integration for computing areas under probability density functions (PDFs) and cumulative distribution. (Tools: Python (SciPy.stats, Seaborn))



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**Empowered Autonomous Institution
Department of Computer Science
UG I & Semester I**

Course Type : VSC-I (Practical)

Course Title : Data Analysis using Spreadsheet

Course Code : 101DSC1501

Credits : 02

Max. Marks: 50

Hours:60

Learning Objectives:

- LO 1. Understand spreadsheet fundamentals and apply them to data analysis tasks.
- LO 2. Perform data cleaning, transformation, and visualization using spreadsheet tools.
- LO 3. Use advanced spreadsheet functions for statistical, logical, and financial analysis.
- LO 4. Apply scenario modeling, pivot tables, and dashboards for decision-making.

Course Outcomes:

After completion of the course, students will be able to-

- CO 1. Demonstrate proficiency in spreadsheet operations for data handling.
- CO 2. Apply statistical and logical functions to analyze datasets.
- CO 3. Create visualizations and dashboards for data-driven insights.
- CO 4. Apply advanced spreadsheet tools for modeling, forecasting, and reporting.

Unit No.	Title of Unit & Contents	Hrs.
I	Spreadsheet Basics and Data Handling	
	Spreadsheet interface, navigation, and formatting Data types and cell referencing (relative, absolute, mixed) Data entry, editing, and validation Sorting, filtering, and conditional formatting Working with multiple sheets and named ranges	
	Unit Outcomes: UO 1. Understand spreadsheet structure and perform basic data operations. UO 2. Apply formatting and referencing techniques for clean data organization.	
II	Functions and Formulas for Data Analysis	
	Arithmetic and logical functions (IF, AND, OR, NOT) Text functions (LEFT, RIGHT, MID, CONCATENATE) Lookup functions (VLOOKUP, HLOOKUP, XLOOKUP, INDEX-MATCH) Date/time functions and error handling Named ranges and formula auditing	
	Unit Outcomes: UO 1. Use logical and lookup functions to extract and manipulate data. UO 2. Apply text and date functions for data transformation..	
III	Data Visualization and Statistical Analysis	
	Charts: bar, column, pie, line, scatter, combo Pivot tables and pivot charts Descriptive statistics: mean, median, mode, variance, standard deviation Histogram, box plot, and trendlines Data cleaning and outlier detection What-if analysis: Goal Seek, Scenario Manager, Data Tables Solver for optimization problems	

	Data consolidation and grouping Dashboard creation with slicers and dynamic charts Importing data from external sources (CSV, web)	
	Unit Outcome: UO 1. Create and interpret charts and pivot tables for data insights. UO 2. Perform basic statistical analysis using spreadsheet functions.	
IV	Perform Below Mentioned Practical based on above contents	60
	1. Explore interface, format cells, use styles (Tools: Excel, Google Sheets) 2. Use data types, drop-downs, restrict inputs (Tools: Excel (Data Validation)) 3. Apply multi-level sorting and filters (Tools: Excel, Google Sheets) 4. Highlight trends, outliers, and duplicates (Tools: Excel (Rules Manager)) 5. Use IF, AND, OR, NOT in real-world scenarios (Tools: Excel) 6. Apply VLOOKUP, HLOOKUP, INDEX-MATCH (Tools: Excel) 7. Clean and transform messy data (Tools: Excel) 8. Summarize and visualize large datasets (Tools: Excel) 9. Compute mean, SD, variance, histogram (Tools: Excel (Analysis ToolPak)) 10. Use Goal Seek, Scenario Manager (Tools: Excel) 11. Solve linear programming problems (Tools: Excel (Solver Add-in)) 12. Build interactive dashboards with slicers (Tools: Excel, Google Sheets)	

Learning Resources:

1. Data Analysis and Analytics Using Spreadsheet, MRCET Faculty, MRCET Publications
2. Excel 2019 Bible, Michael Alexander, Richard Kusleika, John Walkenbach, Wiley
3. Microsoft Excel Data Analysis and Business Modeling , Wayne Winston , Microsoft Press
4. Excel Dashboards and Reports, Michael Alexander, John Walkenbach, Wiley
5. Data Analysis Using Excel, Ash Narayan Sah, Excel Books India
6. Introduction to Data Analysis Using Excel, Sharad Borle (Coursera), Coursera (Online Resource)

Internal Examination Pattern:

CAT – I: Home Assignment

CAT – II: PPT Presentation/ Open Book Test/ Poster Presentation/ Seminar/ Online Quiz /

Descriptive Test

Mapping of POs, PSOs and COs:

CO \ PO/PSO	P O1	P O2	P O3	P O4	P O5	P O6	P O7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	PS O8
CO1	2	2	2	0	0	0	0	2	2	0	2	0	0	0	0
CO2	3	3	2	2	0	0	0	3	3	0	2	0	0	0	2
CO3	2	3	2	2	3	0	0	2	3	0	2	3	0	0	2
CO4	3	3	3	3	2	0	0	3	3	2	2	2	0	0	3

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Semester - II

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Rajarshi Shahu Mahavidyalaya,
Latur (Autonomous)



**Shiv Chhatrapati Shikshan Sanstha's
Rajarshi Shahu Mahavidyalaya, Latur**

**Empowered Autonomous Institution
Department of Computer Science
UG I & Semester II**

Course Type : DSC III

Course Title : Python & Data Structure

Course Code : 101DSC2101

Credits : 03

Marks: 75

Hours: 45

Learning Objectives:

- LO 1. Understand Python syntax, semantics, and core programming constructs.
- LO 2. Apply Python for data manipulation, visualization, and algorithmic problem-solving.
- LO 3. Implement and analyze data structures for efficient data handling.
- LO 4. Develop modular, reusable, and scalable Python programs for data science applications.

Course Outcomes:

After completion of the course, students will be able to-

- CO 1. Write Python programs using control structures, functions, and modules.
- CO 2. Implement and apply data structures like lists, stacks, queues, trees, and graphs.
- CO 3. Use Python libraries for data manipulation and visualization.
- CO 4. Solve real-world problems using Python and appropriate data structures.

Unit No.	Title of Unit & Contents	Hrs.
I	Python Basics and Programming Constructs	12
	Introduction to Python: installation, IDEs, syntax Variables, data types, type casting Operators and expressions Control structures: if-else, loops (for, while) Input/output operations Error handling and debugging	
	Unit Outcomes: UO 1. Write basic Python programs using variables, operators, and control structures. UO 2. Handle user input and exceptions effectively in Python scripts	
II	Functions, Modules, and File Handling	10
	Defining and calling functions Arguments, return values, recursion Lambda, map, filter, reduce Modules and packages File operations: read, write, append Working with CSV, JSON files	
	Unit Outcome: UO 1. Create modular programs using functions and built-in modules. UO 2. Perform file operations and handle structured data formats	
III	Data Structures in Python	13
	Lists, tuples, sets, dictionaries: operations and applications Stack and queue implementation using lists/deque Linked lists: singly, doubly Trees: binary tree, BST Graphs: adjacency list/matrix, BFS, DFS Searching and sorting algorithms	
	Unit Outcomes:	

Unit No.	Title of Unit & Contents	Hrs.
	UO 1. Implement linear and non-linear data structures using Python. UO 2. Apply sorting/searching algorithms to structured data.	
IV	Object-Oriented Programming and Data Science Libraries	10
	Classes and objects, constructors Inheritance, polymorphism, encapsulation Exception handling in OOP Introduction to NumPy, Pandas, Matplotlib Data manipulation and visualization Case studies in data science using Python	
	Unit Outcomes: UO 1. Apply object-oriented principles to build reusable Python components. UO 2. Use Python libraries for data analysis and visualization.	

Learning Resources:

1. Python Programming: An Introduction to Computer Science, John Zelle, Franklin, Beedle & Associates
2. Think Python, Allen B. Downey, O'Reilly Media
3. Data Structures and Program Design Using Python, D. Malhotra, N. Malhotra, Mercury Learning and Information
4. Python for Data Analysis, Wes McKinney, O'Reilly Media
5. Problem Solving with Algorithms and Data Structures Using Python, Bradley N. Miller, David L. Ranum, Franklin Beedle & Associates
6. Fluent Python, Luciano Ramalho, O'Reilly Media

Internal Examination Pattern:

CAT – I: Home Assignment

CAT – II: PPT Presentation/ Open Book Test/ Poster Presentation/ Seminar/ Online Quiz /

Descriptive Test

Mapping of POs, PSOs and COs:

CO \ PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	PS O8
CO1	2	2	3	2	0	0	0	2	3	0	2	0	0	0	0
CO2	3	3	3	2	0	0	0	3	3	2	2	0	0	0	2
CO3	2	3	2	2	3	0	0	2	3	2	2	3	0	0	2
CO4	3	3	3	3	2	0	0	3	3	3	2	2	0	2	3

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UG I & Semester II

Course Type : Lab Course
Course Title : Lab Course –III (Based on DSC-III)
Course Code : 101DSC2103
Credits : 01 Max. Marks: 50 Hours: 30

Learning Objectives:

- LO 1. Understand Python syntax, semantics, and core programming constructs.
- LO 2. Apply Python for data manipulation, visualization, and algorithmic problem-solving.
- LO 3. Implement and analyze data structures for efficient data handling.
- LO 4. Develop modular, reusable, and scalable Python programs for data science applications.

Course Outcomes:

After completion of the course, students will be able to-

- CO 1. Write Python programs using control structures, functions, and modules.
- CO 2. Implement and apply data structures like lists, stacks, queues, trees, and graphs.
- CO 3. Use Python libraries for data manipulation and visualization.
- CO 4. Solve real-world problems using Python and appropriate data structures.

Practical No.	Unit
1	Install Python, write basic programs (Tools: Python, VS Code, Jupyter)
2	Implement decision-making and loops (Tools: Python)
3	Create reusable functions and recursive logic (Tools: Python)
4	Read/write CSV and JSON files (Tools: Python, Pandas)
5	Manipulate and analyze data using collections (Python)
6	Build stack and queue using lists/deque (Tools: Python)
7	Implement singly and doubly linked lists (Tools: Python)
8	Create and traverse binary trees (Tools: Python)
9	Implement BFS and DFS (Python, NetworkX)
10	Apply bubble, merge, binary search (Tools: Python)
11	Build classes, inheritance, and encapsulation (Tools: Python)
12	Use Pandas and Matplotlib for EDA (Tools: Python, VS Code, Jupyter)

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Department of Computer Science
UG I & Semester II

Course Type : DSC IV
Course Title : Linear Algebra
Course Code : 101DSC2102
Credits : 03

Marks: 75

Hours:45

Learning Objectives:

- LO 1. Understand advanced matrix structures and their role in large-scale data science applications.
- LO 2. Apply vector space concepts such as orthogonality, projections, and decompositions to high-dimensional data problems.
- LO 3. Analyze matrix factorizations (SVD, NMF, LU, Eigen) and their applications in machine learning and optimization.
- LO 4. Evaluate the role of linear algebra in regression, kernel methods, and neural networks.
- LO 5. Integrate linear algebra techniques into practical case studies involving recommender systems, NLP, and image data.

Course Outcomes:

After completion of the course, students will be able to-

- CO 1. Represent and manipulate large-scale datasets using sparse, block, and structured matrices.
- CO 2. Construct orthonormal bases and apply QR decomposition for dimensionality reduction and feature extraction.
- CO 3. Implement matrix decompositions (SVD, NMF, LU, Eigen) to solve ML problems such as topic modeling and spectral clustering.
- CO 4. Apply linear algebra formulations to regression, kernel methods, and neural network training.
- CO 5. Demonstrate practical applications of linear algebra in NLP, recommender systems, and image analysis.

Unit No.	Title of Unit & Contents	Hrs.
I	Advanced Matrix Structures for Data Science Sparse Matrices: Storage formats and their critical role in large-scale graph and network datasets. Block Matrices and Partitioned Operations: Enabling parallel and distributed computing. Positive (Semi) Definite Matrices: Theory and applications in covariance matrices and convex optimization. Matrix Norms and Condition Numbers: Quantifying stability, convergence, and numerical precision in ML algorithms. Applications: Dimensionality reduction in recommender systems; graph adjacency matrices for network analysis.	10
	Unit Outcomes: UO 1. Apply sparse and block matrix operations to efficiently represent and process large-scale graph datasets. UO 2. Evaluate matrix norms and condition numbers to assess stability and precision in ML algorithms.	

Unit No.	Title of Unit & Contents	Hrs.
II	Vector Spaces for High-Dimensional Data	10
	<p>Orthogonality, Orthonormal Bases, and Projections.</p> <p>The Gram-Schmidt Process and QR Decomposition: Building blocks for matrix factorizations.</p> <p>Inner Product Spaces and Similarity: Cosine similarity, kernels, and their use in text mining.</p> <p>Dual Spaces and Linear Functionals: Conceptual foundations for feature engineering and optimization.</p> <p>Case Study: Document-term and TF-IDF matrices in Natural Language Processing (NLP).</p>	
	<p>Unit Outcome:</p> <p>UO 1. Construct orthonormal bases using Gram-Schmidt and QR decomposition for matrix factorization.</p> <p>UO 2. Apply inner product spaces and dual functionals to similarity measures and feature engineering in NLP.</p>	
III	Matrix Decompositions & Factorizations for Machine Learning	13
	<p>Singular Value Decomposition (SVD): Theory, low-rank approximation, and Latent Semantic Analysis.</p> <p>Non-negative Matrix Factorization (NMF): Interpretability and applications in topic modeling.</p> <p>LU Decomposition: Solving systems of linear equations for computational efficiency.</p> <p>Schur and Eigendecompositions: Relevance in numerical methods and spectral analysis.</p> <p>Spectral Decomposition</p> <p>Applications: Collaborative filtering, latent factor models, and the algebraic basis of PCA.</p> <p>Comparison of SVD & PCA</p>	
	<p>Unit Outcomes:</p> <p>UO 1. Implement SVD and NMF for dimensionality reduction and topic modeling in text and image data.</p> <p>UO 2. Solve linear systems and perform spectral analysis using LU and Eigen decompositions.</p>	
IV	Linear Algebra in Core Machine Learning Algorithms	12
	<p>Linear Regression: The normal equations and least squares solutions (matrix formulation).</p> <p>Ridge and LASSO Regression: Regularization as optimization in vector space.</p> <p>Kernel Methods: The kernel trick and the geometry of Reproducing Kernel Hilbert Spaces (RKHS).</p> <p>Neural Networks: Forward and backward propagation as sequences of linear transformations and activations.</p> <p>Case Study: Unified view of dimensionality reduction (PCA, t-SNE) for image data.</p>	
	<p>Unit Outcomes:</p> <p>UO 1. Formulate and solve regression problems using matrix-based normal equations and regularization techniques.</p> <p>UO 2. Demonstrate kernel methods and neural network propagation as applications of linear transformations.</p>	

Learning Resources:

1. Introduction to Linear Algebra, Rita Fioresi, Marta Morigi, CRC Press, 2022

2. A Text Book of Linear Algebra: Theory and Applications, Dr. Mahesh Kumar Jayaswal, Dr. Ankita Tiwari, Mr. Kuldeep, Dr. B. Shoba, BR Publications, 2021
3. Linear Algebra Done Right (4th Edition), Sheldon Axler, Springer, 2024
4. Matrix Computations (4th Edition), Gene H. Golub, Charles F. Van Loan, Johns Hopkins University Press, 2013
5. Numerical Linear Algebra, Lloyd N. Trefethen, David Bau III, SIAM, 1997
6. Applied Linear Algebra and Machine Learning, Peter J. Olver, Chehrzad Shakiban, Springer, 2018
7. Linear Algebra and Learning from Data, Gilbert Strang, Wellesley-Cambridge Press, 2019
8. Foundations of Machine Learning, Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, MIT Press, 2018

Internal Examination Pattern:

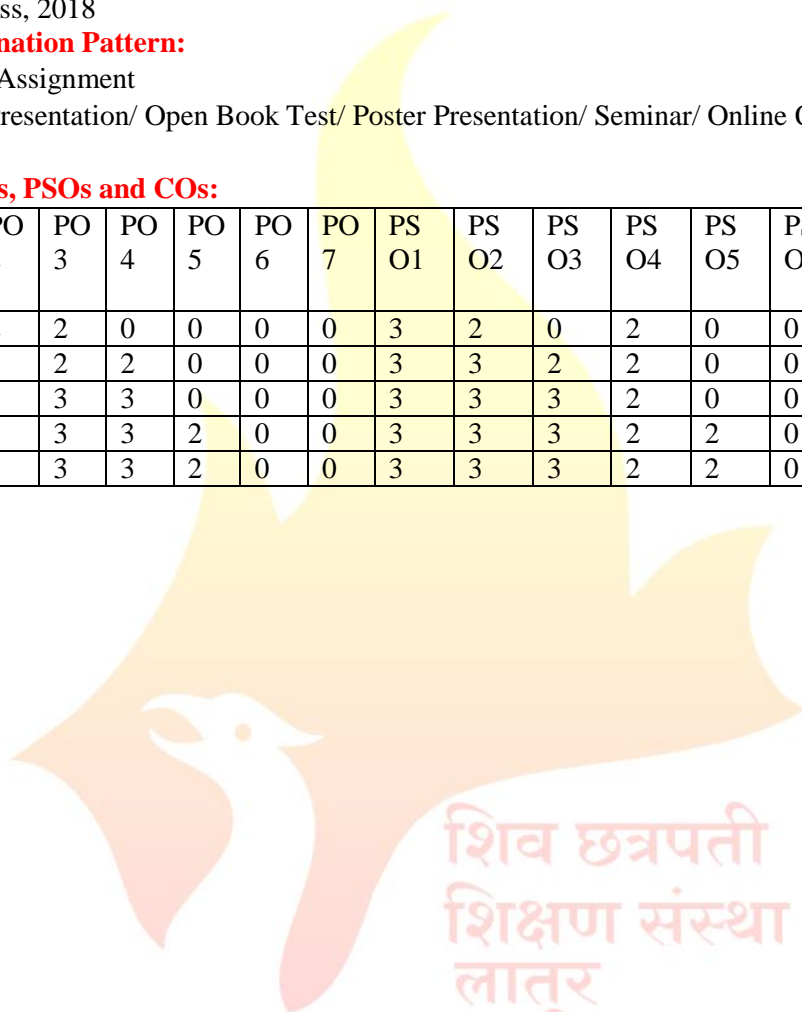
CAT – I: Home Assignment

CAT – II: PPT Presentation/ Open Book Test/ Poster Presentation/ Seminar/ Online Quiz /

Descriptive Test

Mapping of POs, PSOs and COs:

CO \ PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	PS O8
CO1	3	2	2	0	0	0	0	3	2	0	2	0	0	0	2
CO2	3	3	2	2	0	0	0	3	3	2	2	0	0	0	3
CO3	3	3	3	3	0	0	0	3	3	3	2	0	0	0	3
CO4	3	3	3	3	2	0	0	3	3	3	2	2	0	0	3
CO5	3	3	3	3	2	0	0	3	3	3	2	2	0	2	3



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Department of Computer Science
UG I & Semester II

Course Type : Lab Course

Course Title : Lab Course –IV (Based on DSC-IV)

Course Code : 101DSC2104

Credits : 01

Max. Marks: 50

Hours: 30

Learning Objectives:

- LO 1. Understand advanced matrix structures and their role in large-scale data science applications.
- LO 2. Apply vector space concepts such as orthogonality, projections, and decompositions to high-dimensional data problems.
- LO 3. Analyze matrix factorizations (SVD, NMF, LU, Eigen) and their applications in machine learning and optimization.
- LO 4. Evaluate the role of linear algebra in regression, kernel methods, and neural networks.
- LO 5. Integrate linear algebra techniques into practical case studies involving recommender systems, NLP, and image data.

Course Outcomes:

After completion of the course, students will be able to-

- CO 1. Represent and manipulate large-scale datasets using sparse, block, and structured matrices.
- CO 2. Construct orthonormal bases and apply QR decomposition for dimensionality reduction and feature extraction.
- CO 3. Implement matrix decompositions (SVD, NMF, LU, Eigen) to solve ML problems such as topic modeling and spectral clustering.
- CO 4. Apply linear algebra formulations to regression, kernel methods, and neural network training.
- CO 5. Demonstrate practical applications of linear algebra in NLP, recommender systems, and image analysis.

Practical No.	Unit
1	Sparse Matrix Storage Formats <ul style="list-style-type: none">➤ Implement CSR, CSC, and COO formats using scipy.sparse.➤ Compare memory usage vs dense matrices.
2	Graph Adjacency with Sparse Matrices <ul style="list-style-type: none">➤ Represent a social network graph as a sparse adjacency matrix.➤ Perform basic queries (degree, neighbors).
3	Block Matrix Operations <ul style="list-style-type: none">➤ Partition a large matrix into blocks.➤ Perform block-wise multiplication in parallel using numpy slicing.
4	Positive Semi-Definite Check <ul style="list-style-type: none">➤ Write a function to check if a matrix is PSD using eigenvalues.➤ Apply to covariance matrices from synthetic data.
5	Matrix Norms & Condition Numbers <ul style="list-style-type: none">➤ Compute Frobenius, L1, L∞ norms.➤ Calculate condition numbers and analyze stability in solving linear systems.

6	<p>Orthogonality & Projections</p> <ul style="list-style-type: none"> ➤ Implement vector projection onto a subspace. ➤ Visualize in 2D/3D using matplotlib.
7	<p>Gram-Schmidt Process</p> <ul style="list-style-type: none"> ➤ Code Gram-Schmidt orthogonalization step by step. ➤ Verify orthonormality of resulting basis.
8	<p>QR Decomposition</p> <ul style="list-style-type: none"> ➤ Implement QR decomposition manually. ➤ Compare with <code>numpy.linalg.qr</code>.
9	<p>Cosine Similarity in Text Mining</p> <ul style="list-style-type: none"> ➤ Build document-term matrix using <code>sklearn.feature_extraction.text</code>. ➤ Compute cosine similarity between documents.
10	<p>Dual Spaces & Linear Functionals</p> <ul style="list-style-type: none"> ➤ Demonstrate linear functionals on vectors. ➤ Apply to feature weighting in a toy dataset.
11	<p>Singular Value Decomposition (SVD)</p> <ul style="list-style-type: none"> ➤ Perform SVD on an image matrix. ➤ Show low-rank approximations with different k values.
12	<p>Latent Semantic Analysis (LSA)</p> <ul style="list-style-type: none"> ➤ Apply SVD to a document-term matrix. ➤ Extract latent topics.
13	<p>Non-negative Matrix Factorization (NMF)</p> <ul style="list-style-type: none"> ➤ Use <code>sklearn.decomposition.NMF</code> on text data. ➤ Compare interpretability with SVD.
14	<p>LU Decomposition</p> <ul style="list-style-type: none"> ➤ Implement LU decomposition manually. ➤ Solve linear systems and compare with <code>numpy.linalg.solve</code>.
15	<p>Eigen Decomposition & Spectral Analysis</p> <ul style="list-style-type: none"> ➤ Compute eigenvalues/eigenvectors of adjacency matrices. ➤ Apply to spectral clustering.
16	<p>Comparison of SVD & PCA</p> <ul style="list-style-type: none"> ➤ Apply both on the same dataset (e.g., images). ➤ Compare reconstruction error and explained variance.
17	<p>Linear Regression via Normal Equations</p> <ul style="list-style-type: none"> ➤ Implement least squares solution using matrix formulation. ➤ Compare with <code>sklearn.LinearRegression</code>.
18	<p>Ridge & LASSO Regression</p> <ul style="list-style-type: none"> ➤ Implement ridge regression using closed-form solution. ➤ Compare with <code>sklearn.linear_model.Lasso</code>.
19	<p>Kernel Methods & RKHS Geometry</p> <ul style="list-style-type: none"> ➤ Implement kernel trick with Gaussian kernel. ➤ Apply to classification using SVM.
20	<p>Neural Networks as Linear Transformations</p> <ul style="list-style-type: none"> ➤ Build a simple 2-layer NN from scratch using <code>numpy</code>. ➤ Show forward and backward propagation as matrix multiplications.
21	<p>Unified Dimensionality Reduction Case Study</p> <ul style="list-style-type: none"> ➤ Apply PCA and t-SNE on image dataset (e.g., MNIST). ➤ Compare embeddings visually.



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**Empowered Autonomous Institution
Department of Computer Science
UG I & Semester II**

Course Type : VSC-II (Practical)
Course Title : Python for Data Science
Course Code : 101DSC2501
Credits : 02

Max. Marks: 50

Lectures: 60 Hrs.

Learning Objectives:

- LO 1. Understand the basics and tools of Python in the context of data analysis.
- LO 2. Apply Python libraries to explore, manipulate and visualize data.
- LO 3. Perform statistical analysis and machine learning tasks using Python.
- LO 4. Solve real-world data problems with structured workflows.

Course Outcomes:

After completion of the course, students will be able to-

- CO 1. Master Python programming techniques suited for data science applications.
- CO 2. Use essential Python libraries like NumPy, Pandas, Matplotlib, Scikit-learn.
- CO 3. Analyze and visualize data sets effectively.
- CO 4. Apply machine learning models to datasets and evaluate performance.

Unit No.	Title of Unit & Contents	Hrs.
I	Python Basics & Data Science Foundations	
	Python programming recap: syntax, data types, functions, loops, conditionals Data Structures in Python: Lists, Tuples, Dictionaries, Sets Introduction to Jupyter Notebook & Google Colab NumPy basics: arrays, broadcasting, indexing, operations Pandas' introduction: Series, DataFrames, data wrangling Data Input/Output using Pandas	
	Unit Outcomes: UO 1. Demonstrate proficiency in Python syntax and core data structures. UO 2. Use NumPy and Pandas for basic data analysis and manipulation.	
II	Exploratory Data Analysis & Visualization	
	Descriptive Statistics using Pandas Data Cleaning: missing values, duplicates, outliers Data transformation & feature engineering Data visualization with Matplotlib, Seaborn Introduction to Plotly for interactive plots Working with time series and categorical data	
	Unit Outcomes: UO 1. Perform exploratory data analysis using Python libraries. UO 2. Create effective visualizations to communicate insights.	
III	Statistics & Machine Learning with Python	
	Introduction to probability and statistical distributions Hypothesis testing using SciPy Introduction to machine learning concepts Supervised Learning: Regression, Classification Model evaluation: accuracy, confusion matrix, ROC curves Unsupervised Learning: K-Means, Hierarchical Clustering	

	<p>Capstone Workflows & Real-World Applications</p> <p>Full data science workflow using a real dataset Data preprocessing pipeline automation Feature selection & dimensionality reduction Model tuning and hyperparameter optimization Working with pipelines using Scikit-learn Introduction to Flask/Streamlit for creating simple data apps</p> <p>Unit Outcome:</p> <p>UO 1. Apply statistical methods for data analysis using SciPy. UO 2. Build machine learning models and evaluate their performance. UO 3. Design and execute a complete data science pipeline.</p>	
IV	Perform Below mentioned Practical based on above contents	60
	<ol style="list-style-type: none"> 1. Python Fundamentals: Variables and Data Types 2. Array Operations with NumPy 3. Series and DataFrames with Pandas 4. Exploratory Data Analysis on Sample Dataset 5. Handling Missing Data 6. Visualizing Distributions and Relationships 7. Time Series Analysis Basics 8. Hypothesis Testing using SciPy 9. Simple Linear Regression 10. Classification with Decision Trees 11. Clustering on Unlabeled Data 12. Build a Mini Data App with Streamlit 	

Learning Resources:

1. Python for Data Analysis, Wes McKinney, O'Reilly Media
2. Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly Media
3. Introduction to Machine Learning with Python, Andreas C. Müller, Sarah Guido, O'Reilly Media
4. Think Stats: Exploratory Data Analysis in Python, Allen B. Downey, O'Reilly Media
5. Practical Statistics for Data Scientists, Peter Bruce, Andrew Bruce, O'Reilly Media

Internal Examination Pattern:

CAT – I: Home Assignment

CAT – II: PPT Presentation/ Open Book Test/ Poster Presentation/ Seminar/ Online Quiz /

Descriptive Test

Mapping of POs, PSOs and COs:

CO \ PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	PS O8
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CO2	2	3	2	1	0	0	0	2	3	0	2	0	0	0	0
CO3	1	2	3	2	3	0	0	2	3	0	3	3	0	0	2
CO4	0	1	2	3	2	1	0	2	3	3	3	2	2	0	2



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UG First Year**

Basket I: Generic/Open Elective (GE/OE)

(GEs offered to the Science & Technology students in Sem.-I)

Sr. No.	BoS Proposing GE/OE	Code	Course Title	Credits	Hrs.
1	Commerce	101AAF1401	Mutual Fund Management	04	60
2	Commerce	101MAE1401	Fundamentals of Statistics	04	60
3	English	101ENG1402	English for Science and Technology	04	60
4	Geography	101GEO1401	General Geography	04	60
5	Commerce	101BAI1401	Personal Financial Management	04	60
6	Marathi	101MAR1401	स्पर्धा परीक्षा आणि मराठी भाषा	04	60
7	Political Science	101POL1401	Human Rights	04	60
8	Biotechnology	101BIO1401	Nutrition, Health and Hygiene	04	60
9	Music	101MUS1401	Indian Vocal Classical & Light Music	04	60
10	NCC Studies	101NCC1401	Introduction to NCC	04	60
11	Sports	101SPO1401	Counseling and Psychotherapy	04	60

Note: Student can choose any one GE from the basket

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UG First Year

Basket II: Skill Enhancement Courses (SEC)

(SEC offered to the Science & Technology students in Sem.-I)

Sr. No.	BoS Proposing SEC	Code	Course Title	Credits	Hrs.
1	Chemistry	101CHE1601	Pesticides and Green Chemistry	02	30-45
2	Information Technology	101COM1601	Basics of Python Programming	02	30-45
3	Physics	101PHY1601	Physics Workshop Skills	02	30-45
4	Biotechnology	101BIO1601	Food Processing Technology	02	30-45
5	Botany	101BOT1601	Mushroom Cultivation Technology	02	30-45
6	English	101ENG1601	Proof Reading and Editing	02	30
7	Information Technology	101COA1601	PC Assemble and Installation	02	30-45
8	Marathi	101MAR1601	कथा/पटकथालेखन	02	30
9	Zoology	101ZOO1601	Bee Keeping	02	30-45

Note: Student can choose any one SEC from the basket



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Basket III: Ability Enhancement Courses (AEC)

(AEC offered to the Science & Technology students in Sem.-I)

Sr. No.	BoS Proposing AEC	Code	Course Title	Credits	Hrs.
1	Marathi	101MAR7101	भाषिक कौशल्य भाग – १	02	30
2	Hindi	101HIN7101	हिंदी भाषा शिक्षण भाग – १	02	30
3	Sanskrit	101SAN7101	व्यावहारिक व्याकरण व नितिसुभाषिते	02	30
4	Pali	101PAL7101	उपयोजित व्याकरण	02	30

Note: Student can choose any one AEC from the basket.



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Extra Credit Activities

Sr. No.	Course Title	Credits	Hours T/P
1	MOOCs	Min. of 02 credits	Min. of 30 Hrs.
2	Certificate Courses	Min. of 02 credits	Min. of 30 Hrs.
3	IIT Spoken Tutorial Courses	Min. of 02 credits	Min. of 30 Hrs.

Guidelines:

Extra -academic activities

1. All extra credits claimed under this heading will require sufficient academic input/ contribution from the students concerned.
2. Maximum 04 extra credits in each academic year will be allotted.
3. These extra academic activity credits will not be considered for calculation of SGPA/CGPA but will be indicated on the grade card.

Additional Credits for Online Courses:

1. Courses only from SWAYAM and NPTEL platform are eligible for claiming credits.
2. Students should get the consent from the concerned subject Teacher/Mentor/Vice Principal and Principal prior to starting of the course.
3. Students who complete such online courses for additional credits will be examined/verified by the concerned mentor/internal faculty member before awarding credits.
4. Credit allotted to the course by SWAYAM and NPTEL platform will be considered as it is.

Additional Credits for Other Academic Activities:

1. One credit for presentation and publication of paper in International/National/State level seminars/workshops.
2. One credit for measurable research work undertaken and field trips amounting to 30 hours of recorded work.
3. One credit for creating models in sponsored exhibitions/other exhibits, which are approved by the concerned department.
4. One credit for any voluntary social service/Nation building exercise which is in collaboration with the outreach center, equivalent to 30 hours
5. All these credits must be approved by the College Committee.

Additional Credits for Certificate Courses:

1. Students can get additional credits (number of credits will depend on the course duration) from certificate courses offered by the college.
2. The student must successfully complete the course. These credits must be approved by the Course Coordinators.

3. Students who undertake summer projects/ internships/ training in institutions of repute through a national selection process, will get 2 credits for each such activity. This must be done under the supervision of the concerned faculty/mentor.

Note:

1. The respective documents should be submitted within 10 days after completion of Semester End Examination.
2. No credits can be granted for organizing or for serving as office bearers/ volunteers for Inter-Class / Associations / Sports / Social Service activities.
3. The office bearers and volunteers may be given a letter of appreciation by the respective staff coordinators. Besides, no credits can be claimed for any services/activities conducted or attended within the college.
4. All claims for the credits by the students should be made and approved by the mentor in the same academic year of completing the activity.
5. Any grievances of denial/rejection of credits should be addressed to Additional Credits Coordinator in the same academic year.
6. Students having a shortage of additional credits at the end of the third year can meet the Additional Credits Coordinator, who will provide the right advice on the activities that can help them earn credits required for graduation.



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Examination Framework**

Theory:

40% Continuous Assessment Tests (CATs) and 60% Semester End Examination (SEE)

Practical:

50% Continuous Assessment Tests (CATs) and 50% Semester End Examination (SEE)

Course	Marks	CAT & Mid Term Theory				CAT Practical		Best Scored CAT & Mid Term	SEE	Total
		Att.	CAT I	Mid Term	CAT II	Att.	CAT			
1	2	3				4		5	6	5 + 6
DSC/DSE/GE/OE/Minor	100	10	10	20	10	-	-	40	60	100
DSC	75	05	10	15	10	-	-	30	45	75
Lab Course/AIPC/OJT/FP	50	-	-	-	-	05	20	-	25	50
VSC/SEC/AEC/VEC/CC	50	05	05	10	05	-	-	20	30	50

Note:

1. All Internal Exams are compulsory
2. Out of 02 CATs best score will be considered
3. Mid Term Exam will be conducted by the Exam Section
4. Mid Term Exam is of Objective nature (MCQ)
5. Semester End Exam is of descriptive in nature (Long & Short Answer)
6. CAT Practical (20 Marks): Lab Journal (Record Book) 10 Marks, Overall Performance 10 Marks.

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