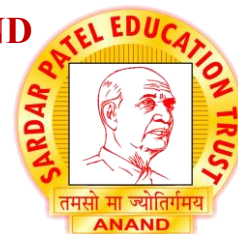




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Revised Syllabus as per NEP 2020 with effect from the Academic Year 2026-2027

Master of Science (Data Science)

Semester – I

Course Code	PGN1CMDS04	Title of the Course	Principles of Data Science
Total Credits	04	Hours per Week	04 Hours / Week

Course Learning Outcomes (CLOs)

CLO 1	Explain the fundamental concepts, terminology, processes, tools, applications, and significance of Data Science, and describe current trends, analytical techniques, and career opportunities in the field.
CLO 2	Classify different types of digital data, distinguish between structured and unstructured data, and interpret various forms of data including text, graph, multimedia, and streaming data for Data Science applications.
CLO 3	Apply the stages of the Data Science process to define research goals, collect and prepare data, perform data exploration and modeling, and present analytical results effectively.
CLO 4	Analyze data management techniques including data aggregation, integration, warehousing, mining, and visualization to support decision-making using diverse data sources.

Course Content

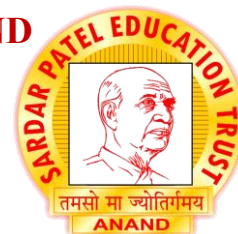
Unit No.	Description	Weightage (%)
1.	Introduction to core concepts and technologies • Introduction, Terminology, data science process, data science toolkit, Types of data, Example Application • Data science needs and features • Importance of data science in modern business • Current trends in data science • Analytical techniques • Jobs in data science	25%
2.	Basic factors for Data • What is data? Types of digital data • Working with structured and unstructured data • Natural language and Machine generated data • Graph based or Network data	25%



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	Audio, Image and Video data, Data streaming	
3.	Data science process - Setting the research goal - Retrieving or Collecting Data - Data preparation, Validating - Data exploration and modeling - Resulting analysis, Presentation and Automation - Benefits of data science process	25%
4.	Advanced Data Science management - Data Aggregation, Integration - Data warehouse, Data mining - Transactional Data – Biological Data – Spatial Data – Social Network Data – Data Evolution - Advance data management and analysis - Data Visualizations	25%

Teaching – Learning Methodology

The course would be taught / learnt through ICT (e.g. Power Point Presentation, Audio-Visual Presentation), Lectures, Quizzes, Assignments, Case Study and Browsing E- Resources & Practical Learning.

Examination Evaluation Pattern

Sr. No.	Particulars	Weightage (%)
01	Continuous and Comprehensive Evaluation (CCE) (Formative Assessment)	50%
02	Semester End Evaluation (SEE) (Summative Assessment)	50%
	TOTAL	100%

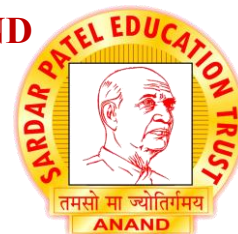
Specifications for CCE and SEE

Sr. No.	Details of the Evaluation Pattern	Marks
01	Continuous and Comprehensive Evaluation (CCE) (Formative Assessment)	
	A Assignments	10
	B Multiple Choice Questions	05
	C Attendance	05
	D Written Examination (01 Hour)	30
	(Formative Assessment) (A + B + C + D)	50 Marks
02	Semester End Evaluation (SEE) (Summative Assessment)	



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E	Written Examination (02 Hours)	50 Marks
	TOTAL(For 04 Credit Courses)	100 Marks

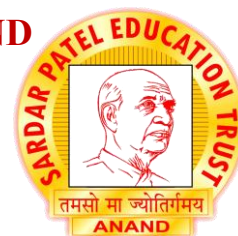
Rubrics – Based Assessment for Assignments (10 Marks)		
Excellent	09 – 10 Marks	Demonstrates excellent understanding of Data Science concepts, correctly applies data handling and analysis techniques, uses appropriate tools/visualization methods effectively, presents accurate results with clear interpretation, and submits a well-organized report or assignment.
Good	07 – 08 Marks	Shows good conceptual understanding, correctly applies most data science techniques with minor errors, appropriate use of tools and visualizations, and presents mostly accurate analysis and interpretation.
Average	05 – 06 Marks	Demonstrates basic understanding of concepts, partially applies data science techniques, includes some errors in data analysis or interpretation, and provides partially correct results.
Basic	03 – 04 Marks	Shows limited understanding of Data Science concepts, incomplete or incorrect application of data handling or analysis techniques, weak interpretation of results, and incomplete submission.
Poor	01 – 02 Marks	Demonstrates inadequate understanding of concepts, incorrect or irrelevant analysis, improper use of tools, inaccurate results, or very poor presentation.
Below Poor	Zero Marks / NA	Assignment not submitted, copied/plagiarized, or completely irrelevant to the given task.
Note: Assignments may be taken in forms of written project, computerized and online suggested courses / certificates as per the decision made by the respective faculties of the courses.		

Rubrics – Based Assessment for Multiple Choice Questions (05 Marks)		
05 Multiple Choice Questions – 01 Mark Each (05 Marks)		
Excellent	01 Mark	The chosen option is correct, no errors in response
Below Poor	Zero Marks / NA	Chosen option is incorrect, completely irrelevant, multiple options chosen / Not Attempted



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Rubrics – Based Assessment for Attendance (05 Marks)

As per the Rules and Regulations provided by the Academic Section of Sardar Patel University, Vallabh Vidyanagar, for the students studying in all departments and colleges.

Reference No.: E – 3 / 3127; dated: 07-03-2024.

<https://www.spuvvn.edu/orbit-cdn/uploads/circulars/Circular-NEP-InternalExamMarks-March-April24.pdf>

Excellent	05 Marks	More than 90% (Minimum 54 Hours for 04 Credits Courses)
Good	04 Marks	80% - 89% (48 to 53 Hours for 04 Credit Courses)
Average	03 Marks	70% - 79% (42 to 47 Hours for 04 Credit Courses)
Poor	Zero / NA	Less than 70% (Less than 42 Hours) (NOT ELIGIBLE TO APPEAR FOR EXAM)

Note:

- Students with below 70% of attendance must submit their written application to their respective class coordinators with genuine reasons and evidence (in case of working or medical emergencies). Students must **not** pursue dual degree programmes that clash with the college's timings.

Rubrics – Based Assessment for Mid-Semester Examination (30 Marks)

Any Two Unit or 50% of The Syllabus - 15 Marks Each Question

Excellent	13 – 15 Marks	Accurate, error-free, logically presented, timely submission
Good	10 – 12 Marks	Minor errors and good conceptual clarity
Average	07 – 09 Marks	Basic understanding or partially correct
Basic	04 – 06 Marks	Limited clarity, noticeable mistakes, incomplete content
Poor	01 – 03 Marks	Inadequate conceptual clarity, incorrect content
Below Poor	Zero Marks / NA	Content is irrelevant / Not Attempted / Not Submitted

Note:

- Written Examination questions will be based on various levels of Revised Bloom's Taxonomy.

Rubrics – Based Evaluation Pattern for End-Semester Examination (50 Marks)

06 Multiple Choice Questions – 01 Mark Each (06 Marks)

Excellent	01 Mark	The chosen option is correct, no errors in response
Below Poor	Zero Marks / NA	Chosen option is incorrect, completely irrelevant, multiple options chosen / Not Attempted

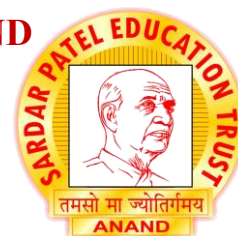
Short Question (12 Marks) – 6 Question from all Units



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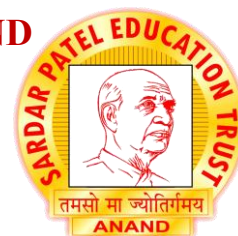
Excellent	02 Marks	Demonstrates accurate understanding of concepts related to questions. Provides correct calculations, appropriate formulas, and clear explanations with complete answers.
Good	01 Mark	Shows partial understanding of concepts with some correct steps or explanations. Minor errors or incomplete answers may be present.
Poor	00 Mark	Incorrect, irrelevant, or no response provided.
UNIT I - 08 Marks Each Question		
Excellent	06 – 08 Marks	Correctly explains Data Science concepts, terminology, lifecycle, tools, applications, analytical techniques, business importance, current trends, and career opportunities with appropriate examples.
Good	04 – 06 Marks	Demonstrates good understanding of core Data Science concepts with minor conceptual errors or incomplete explanations.
Average	03 – 04 Marks	Shows basic understanding of Data Science concepts but explanations lack depth or accuracy.
Basic	02 – 03 Marks	Demonstrates limited knowledge of Data Science fundamentals and provides incomplete or partially correct responses.
Poor	01 – 02 Marks	Shows minimal understanding of Data Science concepts with mostly incorrect or irrelevant answers.
Below Poor	Zero Marks / NA	No attempt or completely irrelevant response.
UNIT II - 08 Marks Each Question		
Excellent	06 – 08 Marks	Correctly identifies and classifies different types of digital data, distinguishes structured and unstructured data, and explains text, graph, multimedia, and streaming data with suitable examples.
Good	04 – 06 Marks	Demonstrates good understanding of data types and characteristics with minor classification or conceptual errors.
Average	03 – 04 Marks	Shows moderate understanding of data types but lacks clarity in distinguishing different forms of data.
Basic	02 – 03 Marks	Demonstrates limited understanding of digital data and provides incomplete or partially correct explanations.
Poor	01 – 02 Marks	Shows minimal understanding of data concepts and gives largely incorrect or irrelevant responses.



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Below Poor	Zero Marks / NA	No attempt or completely irrelevant response.
UNIT III - 08 Marks Each Question		
Excellent	06 – 08 Marks	Correctly applies all stages of the Data Science process including problem definition, data collection, preparation, validation, exploration, modeling, analysis, presentation, and automation with logical workflow.
Good	04 – 06 Marks	Demonstrates good understanding of the Data Science process with minor omissions or procedural errors.
Average	03 – 04 Marks	Shows moderate understanding of the Data Science workflow but misses important stages or explanations.
Basic	02 – 03 Marks	Demonstrates limited understanding of the Data Science process with incomplete workflow or incorrect sequence.
Poor	01 – 02 Marks	Shows minimal understanding of the Data Science process and provides largely incorrect responses.
Below Poor	Zero Marks / NA	No attempt or completely irrelevant response.
UNIT IV - 08 Marks Each Question		
Excellent	06 – 08 Marks	Correctly explains data aggregation, integration, warehousing, mining, advanced data management techniques, various data types, and creates meaningful data visualizations with accurate interpretation.
Good	04 – 06 Marks	Demonstrates good understanding of advanced data management concepts and visualization techniques with minor conceptual errors.
Average	03 – 04 Marks	Shows moderate understanding of data management and visualization concepts but lacks completeness or accuracy.
Basic	02 – 03 Marks	Demonstrates basic awareness of advanced Data Science concepts but provides incomplete or partially correct explanations.
Poor	01 – 02 Marks	Shows minimal understanding of advanced data management and visualization concepts with largely incorrect responses.
Below Poor	Zero Marks / NA	No attempt or completely irrelevant response.

Note:

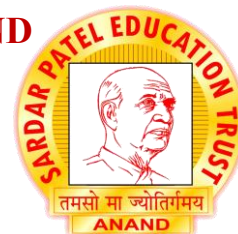
- Multiple Choice Questions of 10 Marks will be based on various levels of Revised Bloom's Taxonomy.
- Written Examination questions will be based on various levels of Revised Bloom's Taxonomy.



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PLO – CLO Mapping								
Principles of Data Science								
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
CLO 1	3	2	1	1	0	0	0	2
CLO 2	2	3	2	2	1	0	0	2
CLO 3	3	3	3	2	2	1	0	2
CLO 4	3	3	3	3	3	2	1	3
Note: High: 03 ; Moderate: 02 ; Low: 01 ; No Mapping: 00								

Suggested References and E-Resources for Further Reading	
• Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016	
• Ethics and Data Science, D J Patil, Hilary Mason, Mike Loukides, O' Reilly, 1st edition, 2018	
• Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly, 1st edition, 2015	
• https://www.javatpoint.com/data-science	
• https://www.heavy.ai/learn/data-science	
