

Program Name	Program Outcomes
<p>Bachelor of Science In Data Science (B.Sc.DS)</p>	<p>PO1: Build a strong foundation of statistics for data science.</p> <p>PO2: Use all the features and new updates of Python and R for data science.</p> <p>PO3: Perform scientific and technical computing using the Python SciPy package and its sub packages Integrate, Optimize, Statistics, IO, and Weave.</p> <p>PO4: Gain expertise in mathematical computing using the NumPy and Scikit-Learn package.</p> <p>PO5: Gain an in-depth understanding of data structure and data manipulation.</p> <p>PO6: Understand and use linear and non-linear regression models and classification techniques for data analysis.</p> <p>PO7: Obtain a comprehensive knowledge of supervised and unsupervised learning models such as linear regression, logistic regression, clustering, dimensionality reduction, K-NN and pipeline.</p> <p>PO8: Master the concepts recommendation engine, time series modelling, gain practical mastery over principles, algorithms, and applications of Machine Learning.</p> <p>PO9: Learn to analyse data using Tableau and Power BI and become proficient in building interactive dashboards.</p> <p>PO10: Understand deep reinforcement learning techniques applied in Natural Language Processing.</p> <p>PO11: Understand the different components of the Hadoop ecosystem and learn to work with HBase, its architecture and data storage, learning the difference between HBase and RDBMS, and use Hive and Impala for partitioning.</p> <p>PO12: Understand Map Reduce and its characteristics and learn how to ingest data using Sqoop and Flume.</p>



Program Name and Semester	Bachelor of Science in Data Science (B.Sc.DS) Semester -I
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Course Name	Course Outcomes
Descriptive Statistics	<p>CO1: To understand the use and importance of statistical data by tabulating and implementing sampling methods.</p> <p>CO2: Able to identify association between the variables as well as Computing Consistent and in Consistent data.</p> <p>CO3: Able to Compute level of measures and apply as well as interpret data into graphs.</p> <p>CO4: Apply measure of central tendency to minimize the sum of squared deviation.</p> <p>CO5: Able to understand the basic assumption behind regression analysis and determine the model is significance as well as able to apply various techniques for the modelling.</p>
Introduction to Programming	<p>CO1: Proficiency in using and applying various data types including string, array list, tuple and dictionary.</p> <p>CO2: Ability to use regular expressions to perform Complex operations in less Code.</p> <p>CO3: Learning to make use of date and time in Python for various applications.</p> <p>CO4: Proficiency in using IPython architecture for Data Science Applications.</p> <p>CO5: Knowledge about the use of various data science tools.</p>
Web Technology	<p>CO1: Understand the meaning of the basic terminologies of web technology and explore, use the HTML5 Concepts. Understand the basic requirements of web design.</p> <p>CO2: Understand and use the Page layout, Navigation, Tables, Forms and Media features of HTML5.</p> <p>CO3: Understand and use Cascading Style sheet for beautifying the web pages.</p> <p>CO4: Implement Java Script for validation of user forms in web pages.</p> <p>CO5: To design the technique of transmitting data between a server and web application using JSON.</p>
Business Communication and Information Ethics	<p>CO1: Communicate effectively in non-verbal way, draft and write effective business letters.</p> <p>CO2: Effectively carryout Communication activities of business by following email etiquettes, drafting memos.</p> <p>CO3: Write elegant business reports and prepare user instruction manual.</p> <p>CO4: Apply information ethics in all walks of life.</p> <p>CO5: Become a good Communicator in life.</p>
Precalculus	CO1: Apply the knowledge of numbers, graph and functions in real life.



Course Name	Course Outcomes
	<p>CO2: Apply trigonometry in modelling real life problems.</p> <p>CO3: Use analytic trigonometry and inverse circular functions to solve a variety of problems.</p> <p>CO4: Apply complex numbers theory to different domains, use vectors and matrices to solve real life problems.</p> <p>CO5: Identify different types of conics from equations, understand sequences and series and basics of limits and derivatives.</p>



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Course Name	Course Outcomes
Probability and Distributions	<p>CO1: Organize, manage and present data.</p> <p>CO2: Analyse statistical data graphically using frequency distributions and cumulative frequency distributions.</p> <p>CO3: Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.</p> <p>CO4: Translate real-world problems into probability models.</p> <p>CO5: Derive the probability density function of transformation of random variables.</p> <p>CO6: Calculate probabilities and derive the marginal and conditional distributions of bivariate random variables.</p>
Database Management	<p>CO1: Students should be able to evaluate business information problem and find the requirements of a problem in terms of data.</p> <p>CO2: Students should be able to draw database design in logical structure and can identify the entities which exist in a system</p> <p>CO3: Students should be able to construct normalized database and functional dependencies between attributes and relational algebra queries</p> <p>CO4: Students should be able to design the database schema with the use of appropriate data types for storage of data in database.</p> <p>CO5: Students should be able to create, manipulate, query and back up the databases with features of SQL.</p>
R Programming	<p>CO1: To use R Studio and explore the features for R programming.</p> <p>CO2: To use R functions and graphics within R programming for solving problems.</p> <p>CO3: To work with advanced graphics of R, import and use the data and represent the data into tables.</p> <p>CO4: To apply formatting on table, use Pipelines in application and use strings, factors in R programmer.</p> <p>CO5: To manipulate Data Frames and make use of Dates in R application.</p>
Environmental Science	<p>CO1: Ability to recognize and explain the importance of the environment and its resources.</p> <p>CO2: Knowledge about insights into ecology and biodiversity.</p> <p>CO3: Recognize the cause and effects of environmental pollution and other social issues.</p> <p>CO4: Knowledge about population and its impact on the environment.</p> <p>CO5: Insight into environment management and sustainable development.</p>



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Calculus	CO1: Quickly and easily find the derivative of a function. CO2: Perform integration of functions with ease. CO3: Apply the knowledge of derivatives and integration to different domains and obtain the results. CO4: Apply the knowledge of multiple integrals and polar coordinates to solve real life problems with ease. CO5: Use partial derivatives and differential equations to solve variety of problems.



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Course Name	Course Outcomes
Research Methods and Ethics	<p>CO1: Learner understands the reasons for doing research, the applications of research, characteristics and requirements of the research process, types of research and Research paradigms.</p> <p>CO2: Learner is applying major approaches to information gathering, the relationship between attitudinal and measurement scales Methods for exploring attitudes in research.</p> <p>CO3: Learner is able to analyze data in qualitative and quantitative studies, application of IT in data analysis.</p> <p>CO4: Learner is able to write a research report and use Information Technology in Research</p> <p>CO5: Learner is practicing ethical codes and practices of conduct research.</p>
Data Structures and Algorithms Using Python	<p>CO1: Learner is capable of choosing appropriate data structure in Python for specified problems and algorithms.</p> <p>CO2: Learner is able to implement Linked list and Stack data structure in various domains.</p> <p>CO3: Learner is able to implement Tree and Queue data structures and use their operation.</p> <p>CO4: Learner has ability to apply of Hashing techniques, Symbol Table and Graph Algorithms appropriately.</p> <p>CO5: Learner has skills to handle sorting, searching and pattern matching on various data structures</p>
Economics	<p>CO1: Learner understands the basic economic decisions that underline the economic process: What and how to produce goods and services and how they are distributed.</p> <p>CO2: Learner is able to apply of the concepts of scarcity, choice and opportunity cost to analyze the workings of a market economy.</p> <p>CO3: Learner is able to demonstrate a firm knowledge of the interrelationships among consumers, government, business and the rest of the world in the U.S. macro economy.</p> <p>CO4: Learner is able to identify the process of how the nation's output of goods and services is measured through the national income and product accounts; clearly comprehend the income and expenditure approaches to measuring national output and national income.</p> <p>CO5: Learner is capable to clearly illustrate the specific roles and functions of monetary and fiscal policy in the economy and explain how these are applied to the process of shaping economic policy and stabilizing the economy, specifically regarding controlling inflation, promoting full employment and facilitating economic growth</p>
Data Warehouse and Mining	<p>CO1: Learner is able to demonstrate knowledge of business intelligence, data warehouse with clear understanding of architectural types and will be able to establish the relationship between architectural</p>



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	building blocks. CO2: Learner is able to elaborate changing dimensions with respect to current trends & using aggregate tables. CO3: Learner is able to handle the processes of data preprocessing, data transformation and data reduction. CO4: Learner has knowledge of using various Data Mining techniques for classification and clustering. CO5: Learner is able to align the Data Mining techniques for analyzing the datasets using tools like Weka, R or Python
Linear Algebra and Discrete Mathematics	CO 1: Learner is able to perform common matrix operations such as addition, scalar multiplication, multiplication, and transposition. CO 2: Learner is able to describe how the determinant of a product of matrices relates to the determinant of the individual matrices. CO3: Learner expresses clear understanding of the concept of a solution to a game' and also the limitations on the applicability of the theory



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Course Name	Course Outcomes
Testing of Hypothesis	<p>CO1: Learner is developing null and alternative hypotheses to test for a given situation.</p> <p>CO2: Learner is able to differentiate one- and two-tailed hypothesis tests.</p> <p>CO3: Learner is able to do sampling a normal distribution and random sampling.</p> <p>CO4: Learner is using statistical models and their associations in performing hypothesis testing.</p> <p>CO 5: Learner is writing the reports and interpreting the data using the various programming languages and packages</p>
Big Data	<p>CO1: Learner understands the key issues in big data management and its associated applications in intelligent business and scientific computing.</p> <p>CO2: Lerner is acquiring fundamental techniques and algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.</p> <p>CO3: Learner is able to interpret business models and scientific computing paradigms, and apply software tools for big data analytics.</p> <p>CO 4: Learner understands adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc</p>
Fundamentals of Accounting	<p>CO1: Lerner understands the laws governing the business, typical business administration schemes, and the ethics of accountancy, statistics, and accounting theory.</p> <p>CO2: Learner implements the record keeping of financial transactions and further implementations in relevant areas.</p>
Artificial Intelligence	<p>CO 1: Leaner understands building blocks of AI.</p> <p>CO2: Learner is analyzing problem and solving it by implementing suitable techniques.</p> <p>CO3: Learner is applying logic-based techniques to solve examples.</p> <p>CO4: Learner can implement Bayesian approaches.</p> <p>CO5: Learner is using machine learning concepts for solving problems.</p>
Numerical Methods	<p>CO1: Learner implementing Numerical Methods to solve the problems.</p> <p>CO2: Learner is computing the numerical results using raw data.</p> <p>CO3: Learner will interpret different numerical and integration.</p> <p>CO4: Learner will evaluate Numerical Solution of Initial-Value.</p> <p>CO5: Learner will learn Matrix Eigenvalue.</p>



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Course Name	Course Outcomes
Computer Vision	CO1: Understand the fundamentals of image formation. CO2: Use and Demonstrate operations of Image Processing. CO3: Relate and Explain various features of Image. CO4: Understand, Identify and Examine various image patterns. CO5: Design and develop practical and innovative image processing and computer vision applications or systems.
Data Engineering	CO1: To remember and explain the Data Engineering basics and Lifecycle. CO2: To apply the Data Architecture Design with various options available. CO3: To create the Data from source and make use of Storage. CO4: To understand Ingestion process and know about Queries, Modeling, and Transformation. CO5: To Illustrate Data Analytics, Machine Learning and to Explain the importance of Security and Privacy.
Robotic Process Automation	CO1: Understand and implement the mechanism of business process and can provide the solution in an optimize way. CO2: Apply the features use for interacting with database plugins. CO3: Apply and Use the plug-ins and other controls used for process automation. CO4: Implement and handle the different events, debugging and managing the errors. CO5: Test and deploy the automated process.
Campus to Corporate	CO1: Apply active listening techniques and overcome barriers to become a better listener. CO2: Demonstrate improved speaking skills with clarity, confidence, and fluency. CO3: Utilize interview techniques to enhance job interview performance and create impactful résumés. CO4: Apply interpersonal communication skills to build effective relationships and manage conflicts in professional settings. CO5: Effectively deliver negative news messages, develop crisis communication plans, and handle press conferences in challenging situations.
Social Media Analytics	CO1: Demonstrate a comprehensive understanding of social media analytics concepts, theories, and tools. CO2: Apply various social media analytics techniques to extract insights and make informed decisions.



	<p>CO3: Perform social network analysis to uncover patterns, relationships, and influential nodes within social networks.</p> <p>CO4: Utilize text analytics methods to extract meaningful information from social media text data.</p> <p>CO5: Design and implement recommender systems for social media platforms, considering user preferences and item similarities to enhance user experiences.</p>
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Program Name and Semester	Bachelor of Science in Data Science (B.Sc.DS) Semester -VI
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Course Name	Course Outcomes
Machine Learning	<p>CO1: Understand the foundational concepts and principles of Machine Learning</p> <p>CO2: Apply supervised and unsupervised learning techniques, including classification algorithms and clustering algorithms</p> <p>CO3: Evaluate the performance of Machine Learning models using classification metrics, ROC/AUC curve analysis, and cross-validation techniques.</p> <p>CO4: Implement regression models (such as linear regression and logistic regression) and understand their applications in predictive analysis.</p> <p>CO5: Utilize dimensionality reduction techniques (Like PCA) for feature reduction and selection, and apply association rule mining algorithms (such as the Apriori algorithm) for discovering meaningful patterns in datasets.</p>
Exploratory Data Analysis	<p>CO1: Understand importance of data and its types in Exploratory Data Analysis.</p> <p>CO2: Classify EDA and summary statistics in context of interpretation.</p> <p>CO3: Understand the significance of missing value imputations in better EDA interpretations.</p> <p>CO4: Analyse the measure of central tendency in describing the quick view of data set.</p> <p>CO5: Categorize measure of dispersion and its interpretation in spread ness of data.</p>
Internet of Things	<p>CO1: Describe what IoT is and how it works today and Recognise the factors that contributed to the emergence of IoT</p> <p>CO2: Design and program IoT devices and Use real IoT protocols for communication</p>



	<p>CO3: Secure the elements of an IoT device</p> <p>CO4: Design an IoT device to work with a Cloud Computing infrastructure.</p> <p>CO5: Transfer IoT data to the cloud and in between cloud providers and Define the infrastructure for supporting IoT deployments</p>
Applied Business Analytics	<p>CO1: Understand basics of statistical concepts like probability distribution, hypothesis testing etc.</p> <p>CO2: Experiment with Business Intelligence Tools for Data Analysis.</p> <p>CO3: Make use of the business analytics methods for discovering the knowledge</p> <p>CO4: Apply Regression Analysis with Time Series Analysis and forecasting</p> <p>CO5: Apply and Construct various modelling techniques for Optimization and simulation.</p>
Healthcare Analytics	<p>CO1: Remember and relate Healthcare Analytic basics.</p> <p>CO2: Understand and Experiment with the attributes of Electronic Medical Record to learn about Computing Foundation.</p> <p>CO3: Apply and Evaluate Measuring Techniques of Healthcare Quality.</p> <p>CO4: Design and Build Predictive Models in Healthcare.</p> <p>CO5: Discuss and Modify Various Healthcare Predictive Models and learn about Healthcare and Emerging Technologies.</p>

