



Program Specific Outcomes-B.Sc. (Data Science and Analytics)

Program Specific Outcomes No.	At the end of the program, learners will be able to
PSO 1	Acquire disciplinary knowledge of statistics in Data Science.
PSO 2	Utilize all the features and new updates of Python and R to enhance analytical reasoning.
PSO 3	Apply scientific reasoning to perform scientific and technical computing using the Python SciPy package and its sub-packages Integrate, Optimize, Statistics, IO, and Weave.
PSO 4	Demonstrate critical thinking by gaining expertise in mathematical computing using the NumPy and Scikit-Learn package.
PSO 5	Develop problem-solving skills by gaining an in-depth understanding of data structure.
PSO 6	Employ analytical reasoning to understand and implement linear and non-linear regression models and classification techniques for data analysis.
PSO 7	Acquire research-related skills through a comprehensive knowledge of supervised and unsupervised learning models such as linear regression, logistic regression, clustering, dimensionality reduction, K-NN and pipeline.
PSO 8	Acquire reflective thinking and master the concept of recommendation engine, time series modeling, gain practical mastery over principles, algorithms, and applications of Machine Learning.
PSO 9	Analyze data using Tableau and Power BI and become proficient in building interactive dashboards.
PSO 10	Apply critical thinking by understanding deep reinforcement learning techniques that are applied in Natural Language Processing.

**Course Outcomes for courses under BSc (Data Science and Analytics)
Semester I & II**

Program Name: B.Sc (Data Science and Analytics)	Course Name: Descriptive Statistics	Course Code: 60101
Course Outcome No.	Course Outcome	Program Outcome
CO 1	To understand the use and importance of statistical data by tabulating and implementing sampling methods	PSO 1, PSO 9
CO 2	Able to identify association between the variables as well as computing consistent and inconsistent data.	PSO1, PSO 2, PSO 3
CO 3	Able to compute level of measures and apply as well as interpret data into graphs.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 6, PSO 10
CO 4	Apply measure of central tendency to minimize the sum of squared deviation.	PSO 1, PSO 2, PSO 3, PSO 6, PSO 9
CO 5	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 modeling.	PSO 1, PSO 2, PSO 5, PSO 10

Program Name: B.Sc (Data Science and Analytics)	Course Name: Descriptive Statistics Practical	Course Code: 60102
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Use Microsoft Excel for business and data analytics, applying insert function library, make use of “Add-Ins Tool pack” for different statistical and mathematical function, learn to use formula and function with cell reference and able to use different types of chart suitable to the data.	PSO1, PSO 2, PSO 4, PSO5, PSO 7, PSO 10
CO 2	Do Data Entry and manipulation using data context, to transpose the tabular data, convert data into tabular format and able to use the excel tools for data categorization.	PSO1, PSO 2, PSO 4, PSO5, PSO 7, PSO 10
CO 3	Discover Measures of central tendency by using analysis tools and formula and able to state the conclusion.	PSO 1, PSO 2, PSO 3, PSO 6, PSO 9
CO 4	Find Measures of Dispersion, Skewness & Kurtosis by using formula, calculate statistics measures using add-ins analytical tools, Able to use graph/chart from chart tool and derive the conclusion of the experiment.	PSO 1, PSO 2, PSO 7, PSO 8, PSO 9, PSO 10
CO 5	Display Graphical Presentation with Excel by using graph/Chart, templates to improve presentation of data, represent cumulative frequency, data analysis, understand “cause analysis”, make use of formula and analytical tools to compute combined variance and Standard Deviation and compute coefficient of variation.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 6, PSO 10

CO 6	Find Correlation by applying statistical formula and analytical tool, identifying wrong data entries, make use of financial function using insert and deriving the conclusion of the experiment.	PSO 1, PSO 2, PSO 5, PSO 6, PSO 8, PSO 9, PSO 10
CO 7	Do Regression analysis by predicting using data analysis tools, make use of forecasting techniques, Able to use multiple regression using time series data and deriving conclusion of the experiment.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 6, PSO 7, PSO 9, PSO 10

Program Name: B.Sc (Data Science and Analytics)	Course Name: Introduction to Programming	Course Code: 60103
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Proficiency in using and applying various data types including, string, array list, tuple, and dictionary.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6
CO 2	Ability to use regular expressions to perform complex operations in less code.	PSO 1, PSO 2, PSO 4, PSO 8
CO 3	Learning to make use of date and time in Python for various applications.	PSO 1, PSO 2, PSO 3, PSO 5, PSO 8
CO 4	Proficiency in using IPython architecture for Data Science Applications.	PSO 1, PSO 2, PSO 4, PSO 9, PSO 10
CO 5	Knowledge about the use of various data science tools.	PSO 1, PSO 2, PSO 7, PSO 8, PSO 9, PSO10

Program Name: B.Sc (Data Science and Analytics)	Course Name: Introduction to Programming Practical	Course Code: 60104
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Knowledge about input and output functions in Python and the ability to use loops and control their execution.	PSO 1, PSO 2, PSO 3, PSO 5, PSO 8
CO 2	Ability to develop modular Programs using functions and data types like string, array, and list of Python.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6
CO 3	Ability to develop modular Programs using Date and Time of Python.	PSO 1, PSO 2, PSO 3, PSO 5, PSO 8
CO 4	Interact with IPython and Jupyter notebook.	PSO 1, PSO 2, PSO 4, PSO 9, PSO 10
CO 5	Make use of NumPy Package and different functions available in it.	PSO 1, PSO 2, PSO 3, PSO 6, PSO 7, PSO 9, PSO 10
CO 6	Able to write code using Pandas Package and different functions available in it.	PSO1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 8, PSO 9, PSO 10

Program Name: B.Sc (Data Science and Analytics)	Course Name: Business Communication and Information Ethics	Course Code: 60105
Course Outcome No.	Course Outcome	Program Outcome mapping

CO 1	Communicate effectively in a non-verbal way, draft and write effective business letters.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 2	Effectively carry out communication activities of business by following email etiquettes, drafting memos.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 3	Write elegant business reports and prepare user instruction manuals.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 4	Apply information ethics in all walks of life.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 5	Become a good communicator in life.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10

Program Name: B.Sc (Data Science and Analytics)	Course Name: ICT Practical	Course Code: 60106
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Effective use of ICT software for different purposes in all walks of life.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 9, PSO 10
CO 2	Develop the appropriate personal skills essential for independent learning based around ICT.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 9, PSO 10
CO 3	Develop learners' potential to the fullest by facilitating the acquisition of knowledge, concentrating on higher-order cognitive tasks, and positively affecting attitudes towards further learning.	PSO 1, PSO 2, PSO 6, PSO 7, PSO 8
CO 4	Facilitate better communication among learners, promoting greater social understanding and harmony.	PSO 1, PSO 2, PSO 6, PSO 7
CO 5	Effective use of ICT in governance, agriculture, and healthcare.	PSO 1, PSO 2, PSO 5, PSO 7, PSO 8, PSO 9, PSO 10

Program Name: B.Sc (Data Science and Analytics)	Course Name: Precalculus	Course Code: 60107
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Apply the knowledge of numbers, graphs, and functions in real life.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6
CO 2	Apply trigonometry in modeling real-life problems.	PSO1, PSO 2, PSO 3, PSO 8, PSO 9, PSO10
CO 3	Use analytic trigonometry and inverse circular functions to solve a variety of problems.	PSO 1, PSO 2, PSO 5, PSO 6
CO 4	Apply complex numbers theory to different domains, use vectors and matrices to solve real-life problems.	PSO 1, PSO 2, PSO 5, PSO 7

CO 5	Identify different types of conics from equations, understand sequences and series and basics of limits and derivatives.	PSO 1, PSO 2, PSO 5, PSO 7, PSO 8, PSO 9, PSO 10
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Program Name: B.Sc (Data Science and Analytics)	Course Name: Web Technology	Course Code: 60109
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Understand the meaning of basic terminologies of web technology, explore and use HTML5 concepts, understand the basic requirements of web design.	PSO 1, PSO 2, PSO 5, PSO 8
CO 2	Understand and use the page layout, navigation, tables, forms, and media features of HTML5.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 9, PSO 10
CO 3	Understand and use Cascading Style Sheets (CSS) for beautifying web pages.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8
CO 4	Understand and use JavaScript for validating user forms in web pages.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 8, PSO 9, PSO 10
CO5	Understand and use the technique of transmitting data between a server and web application using JSON.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8

Program Name: B.Sc (Data Science and Analytics)	Course Name: Web Technology	Course Code: 60110
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Use basic HTML tags such as font, link, and text formatting tags.	PSO 1, PSO 2, PSO 5, PSO 8
CO 2	Use and apply navigation, lists, images, etc., in web pages.	PSO1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 9, PSO 10
CO 3	Use user controls and embed multimedia in web pages.	PSO1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 9, PSO 10
CO 4	Use and apply CSS with lists, links, fonts, tables, etc., in web pages.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8
CO 5	Use and apply JavaScript for validating user fields on web pages.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 8, PSO 9, PSO 10
CO 6	Create, parse, and persist the JSON object and extract/use its values on web pages.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8
CO 7	Use JSON object with arrays and message formatting on web pages.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8

Program Name: B.Sc (Data Science and Analytics)	Course Name: Probability and Distributions	Course Code: 60201
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Organize, manage, and present data.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 9

CO 2	Analyze statistical data graphically using frequency distributions and cumulative frequency distributions.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 8, PSO 9, PSO 10
CO 3	Use basic probability rules, including additive and multiplicative laws, using terms like independent and mutually exclusive events.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 7, PSO 8, PSO 9, PSO 10
CO 4	Translate real-world problems into probability models.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6, PSO 9, PSO 10
CO 5	Derive the probability density function of transformation of random variables.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 9, PSO 10
CO 6	Calculate probabilities and derive the marginal and conditional distributions of bivariate random variables.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8

Program Name: B.Sc (Data Science and Analytics)	Course Name: Probability and Distributions Practical	Course Code: 60202
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Use discrete and continuous probability distributions, including requirements, mean, and variance, and making decisions.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6, PSO 9, PSO 10
CO 2	Define binomial outcomes and compute the probability of getting X successes in N trials.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 8, PSO 9
CO 3	Use the normal probability distribution, including standard normal curve	PSO 1, PSO 2, PSO 4, PSO 5, PSO 6, PSO 9, PSO 10
CO 4	Use different distributions to solve simple practical problems.	PSO 1, PSO 2, PSO 4, PSO 5, PSO 9

Program Name: B.Sc (Data Science and Analytics)	Course Name: Database Management	Course Code: 60203
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Evaluate business information problems and identify data requirements.	PSO 1, PSO 2, PSO 3, PSO 6, PSO 7, PSO 8
CO 2	Draw logical database designs and identify system entities.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 8
CO 3	Construct normalized databases and understand functional dependencies between	PSO 1, PSO 2, PSO 3, PSO 7, PSO 8, PSO 9, PSO 10
CO 4	Design database schemas with appropriate data types for data storage.	PSO 1, PSO 2, PSO 3, PSO 5, PSO 6, PSO 7, PSO 9
CO 5	Create, manipulate, query, and back up databases using SQL features.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 10

Program Name: B.Sc (Data Science and Analytics)	Course Name: Database Management Practical	Course Code: 60204
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Draw relationship diagrams.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7

CO 2	Perform various SQL operations: insert, update, delete, and retrieve data.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 10
CO 3	Perform table alterations, database restoration, and backups.	PSO 1, PSO 2, PSO 3, PSO 5, PSO 5, PSO 8, PSO 9, PSO 10
CO 4	Execute simple SQL queries, use aggregate functions for single-value retrieval.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 10
CO 5	Use JOIN keyword for combining tables in SQL queries.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 7, PSO 8, PSO 9, PSO 10
CO 6	Utilize nested queries using IN and EXISTS operators.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 7, PSO 8, PSO 9, PSO10
CO 7	Create new tables by joining existing tables and manage attribute visibility for end users.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO7, PSO 8, PSO 9, PSO 10
CO 8	Implement user access restrictions for database data.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO8, PSO 9, PSO 10

Program Name: B.Sc (Data Science and Analytics)	Course Name: Environmental Science	Course Code: 60205
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Recognize and explain the importance of the environment and its resources.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO10
CO 2	Acquire knowledge about insights into ecology and biodiversity.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO10
CO 3	Recognize the causes and effects of environmental pollution and other related social issues.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO10
CO 4	Acquire knowledge about population and its impact on the environment.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO10
CO 5	Gain insight into environmental management and sustainable development.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO10

Program Name: B.Sc (Data Science and Analytics)	Course Name: Calculus	Course Code: 60207
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Quickly and easily find the derivative of a function.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 2	Perform integration of functions with ease.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10

CO 3	Apply the knowledge of derivatives and integration to different domains and obtain the results.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 4	Apply the knowledge of multiple integrals and polar coordinates to solve real-life problems with ease.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 5	Use partial derivatives and differential equations to solve a variety of problems.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10

Program Name: B.Sc (Data Science and Analytics)	Course Name: R Programming	Course Code: 60209
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	To use R Studio and explore the features for R programming.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 8, PSO 9, PSO 10
CO 2	To use R functions and graphics within R programming for solving problems.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 8, PSO 9, PSO 10
CO 3	To work with advanced graphics of R, import and use the data, and represent the data into tables.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 4	To apply formatting on tables, use Pipelines in applications, and use strings and factors in R programming.	PSO 1, PSO 2, PSO 3, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 5	To manipulate Data Frames and make use of Dates in R application.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 8, PSO 9, PSO10

Program Name: B.Sc (Data Science and Analytics)	Course Name: R Programming Practical	Course Code: 60210
Course Outcome No.	Course Outcome	Program Outcome mapping
CO 1	Use expression for decision making, get Knowledge of types of loops and loop control statements, and able to create, access and manipulate essential data structures.	PSO 1, PSO 2, PSO 3
CO 2	Develop skills to manage multiple data through various options available in R.	PSO 1, PSO 2, PSO 3, PSO 5, PSO 6, PSO7, PSO 8, PSO 9, PSO 10
CO 3	Use R object, simple statistical function for data analysis, and differentiate between linear and multiple regression analysis.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 9, PSO 10
CO 4	Get the knowledge about various functions for Normal and Binomial Distribution and able to implement and analyze data using different time intervals and multiple time series.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 8, PSO 9, PSO 10

CO 5	To create Tabulation for the presentation of data and operation of them and get the knowledge about various ways of plotting data and saving them.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 6	Get the knowledge of implementing class concept in R and able to define reference class, create objects, access and modify fields.	PSO 1, PSO 2, PSO 3, PSO 6, PSO 7, PSO 8, PSO 9, PSO 10
CO 7	Get the knowledge about developing data interface for storing data in CSV files also knowledge about working with Excel files and able to interface with XML files and able to interface with MySQL, query and manipulate data in it.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO 8, PSO 9
CO 8	Get insight into errors related to name errors, control structure error, connection errors, etc., and able to identify and handle errors in R code.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO7, PSO8, PSO 9, PSO 10
CO 9	To analyze the performance of the R code.	PSO 1, PSO 2, PSO 3, PSO 4, PSO 5, PSO 6, PSO7, PSO 9, PSO 10